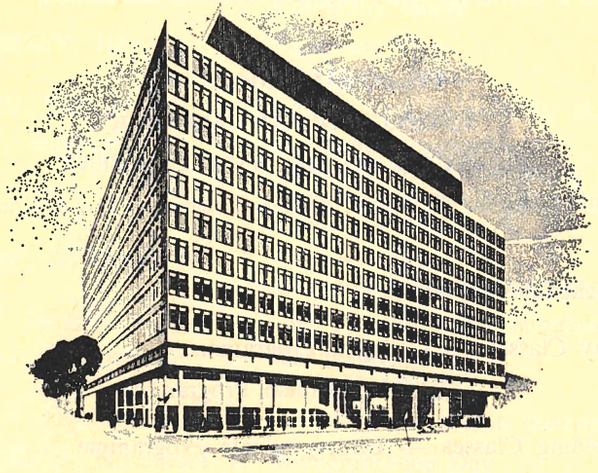
Sir George Williams University
Montreal
Graduate Studies
1970/71

Graduate Studies



SIR GEORGE WILLIAMS UNIVERSITY

1435 Drummond Street
Montreal 107, Quebec

ACADEMIC YEAR 1970-71

COURSE INFORMATION

The publications listed below give information about specific courses and admission requirements. They can be obtained from the Registrar's Office or from the Departments concerned.

COLLEGIAL PROGRAMME

UNDERGRADUATE CALENDAR

GRADUATE STUDIES ANNOUNCEMENT

Brochures for the Special Summer Sessions — Day Division

Class Schedules (Winter)

Day Classes — Collegial Programme
Undergraduate Programme

Evening Classes — Undergraduate Programme

Class Schedules (Summer)

Evening Classes — Undergraduate Programme

Special Summer Sessions (Day) —
Undergraduate Programme

The Student Handbook is published by the Students' Associations and is distributed to all students who attend the University.

CALENDAR OF EVENTS
ACADEMIC YEAR 1970-71

	1970
MONDAY, June 1	Spring Convocation
WEDNESDAY, June 24	St. Jean Baptiste Day University closed
WEDNESDAY, July 1	Dominion Day University closed
MONDAY, September 7	Labour Day – University closed
FRIDAY, September 11	Graduate Registration (pre-registration counseling by department must be completed by Friday, September 4)
MONDAY, September 14	Classes begin Day and Evening Division
FRIDAY, September 25	Last day for thesis submission
MONDAY, October 12	Thanksgiving Day no DAY classes
MONDAY, October 26	Last day for course changes
WEDNESDAY, November 11	Remembrance Day
FRIDAY, November 20	Fall Convocation
SATURDAY, December 12	Last day of classes – first term
	1971
MONDAY, January 4	Classes begin – second term
MONDAY, February 15	Last day for course changes
MONDAY, February 22 TUESDAY, February 23 WEDNESDAY, February 24	Seminar Week
MONDAY, April 5	Last day for thesis submission
WEDNESDAY, April 7	Last day of classes second term
FRIDAY, April 9	Good Friday – University closed
MONDAY, April 12	Easter Monday – University closed
MONDAY, May 31	Spring Convocation

Graduate Studies

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BOARD OF GRADUATE STUDIES

Chairman (1969-70) Stanley G. French, Ph.D.

Secretary Robert A. Fraser, B.A.

The Board of Graduate Studies is the governing body of all graduate programmes at Sir George Williams University. This Board consists of a Chairman, ten administrative officers as ex-officio members, and twelve elected academic members.

OFFICERS OF SIR GEORGE WILLIAMS UNIVERSITY

John O'Brien, Ph.D.	*Principal and Vice-Chancellor*
Jack Bordan, M.Sc., Eng.	*Vice-Principal, Academic*
Ian L. Campbell, M.Sc.	*Dean of Arts*
Samuel Madras, Ph.D.	*Dean of Science (on leave 1970-71)*
John Ufford, Ph.D.	*Acting Dean of Science*
Gunther Brink, B. Comm. M.B.A.	*Dean of Commerce*
J. Clair Callaghan, M.S.	*Dean of Engineering*
John Smola, Ph.D.	*Vice-Principal, Administration and Finance*
Magnus Flynn, B. Comm.	*Dean of Students*
John. L. Hall, B.Sc.	*Director of Personnel*
Helen Howard, M.L.S.	*University Librarian*
Graham Martin, M.Sc., Eng.	*Director of Computer Centre*
Kenneth D. Adams, B.Sc., L. Mus.	*Registrar*
J. P. Petolas, B.Sc.	*Director of Planning*
William M. Reay, C.A.	*Treasurer*
J. A. Sproule, M.Ps.Sc.	*Director of Guidance*
Henry G. Worrell, B.A.	*Controller*

Sir George Williams University offers opportunities for post-graduate study in a wide variety of fields. Within the Faculty of Arts, the following programmes are offered :

Department of Economics :	Master of Arts, and Doctor of Philosophy;
Department of Education :	Master of Arts, in Educational Technology;
Department of English :	Master of Arts;
Department of Fine Arts :	Master of Arts in Art Education;
Department of History	Master of Arts, and Doctor of Philosophy;
Department of Psychology :	Master of Arts in General-Experimental Psychology and in Applied Psychology;
Department of Religion :	Master of Arts in History and Philosophy of Religion and in Judaic Studies.

Within the Faculty of Science, the following programmes are offered :

Department of Biology :	Master of Science;
Department of Chemistry :	Master of Science and Doctor of Philosophy;
Department of Mathematics :	Master in the Teaching of Mathematics (M.T.M.);
Department of Physics :	Master of Science and Doctor of Philosophy.

The Faculty of Commerce offers a programme of study leading to the degree of Master of Business Administration (M.B.A.).

The Faculty of Engineering offers programmes of study leading to the degrees of Master of Engineering (M.Eng.) and Doctor of Engineering (D.Eng.).

It is expected that additionnal programmes in other fields will be offered in subsequent years. In most cases, courses are given in the late afternoon and evening, or in the evening only, making it possible for both day and evening students to attend.

The programmes are administered by the particular academic department concerned (or in the case of the M.Eng. and M.B.A. programmes, by the Faculty of Engineering and the Faculty of Commerce respectively), under the general supervision of the Board of Graduate Studies and its Chairman. Requests for application forms or for further information about any programme should be sent directly to the department in charge of the programme.

Library and Research Facilities

The University Library, located on the upper floors of the Norris Building on Drummond Street, has a rapidly-expanding collection of reference and research materials to meet the needs of graduate students in Arts and Commerce. The Documents Room houses an extensive collection of government documents and newspapers on microfilm, microfiche, and microcard. The Library has been designated a full depository library for Canadian federal government documents. Various cooperative arrangements exist with other research libraries in the Montreal area. In particular, doctoral students at Sir George Williams University have access to the libraries of McGill University and the Université de Montréal.

The Science and Engineering Library is located in the Henry F. Hall Building on Maisonneuve Boulevard, along with the modern and well-equipped laboratories which serve these faculties. The Hall Building also houses the studios of the Department of Fine Arts.

General Regulations

1. The minimum residence requirement for the master's degree is one academic year of full-time study (i.e., the fall and winter terms), or (when permitted) the equivalent in part-time study. This requirement must be met regardless of the amount of graduate work previously completed in any other programme or at any other university. Certain master's programmes require longer minimum periods of residence.

2. The minimum residence requirement for a doctoral degree (Ph.D. or D.Eng.) is two calendar years of full-time graduate study beyond the master's degree, or three calendar years of full-time graduate study beyond the bachelor's degree for those students who are permitted to enroll for doctoral studies without completing a master's degree, or (when permitted) the equivalent in part-time study. It should be understood that this is a minimum requirement, and that a longer period may be necessary in order

to complete all of the work that is required for the degree. In special circumstances, departments may permit or require candidates to spend a period of time in residence at another institution, subject to the approval of the Board of Graduate Studies in each case. When such arrangements are made, it is understood that the candidate will be engaged in full-time study, and that the institution he attends will be able to provide appropriate supervision and research facilities. In all cases, however, candidates for a doctoral degree from Sir George Williams University must complete at least two years of graduate study at this University, including the final year of the required residence period.

3. All work for the master's degree must be completed within five years from the date of initial registration as a graduate student at Sir George Williams University, except in the case of the Master of Business Administration programme for which special regulations apply.

4. Candidates for a doctoral degree must complete all requirements for the degree within six years from the time of their first registration in doctoral studies. Extensions of time can only be granted in cases where the delay can be justified by exceptional circumstances, and must be authorized in each instance by the Board of Graduate Studies.

5. A full-time student is not permitted to engage in employment not directly related to his academic programme for more than ten hours per week. This includes teaching, demonstrating, marking, or work outside the university. A student who exceeds this amount of work must register as a half-time or part-time student.

6. Individuals who have completed an undergraduate programme leading to a bachelor's degree, but whose preparation is inadequate for immediate admission to a graduate programme, may, upon recommendation by a department, be permitted to register for a *Special Year* of advanced undergraduate studies. In order to take courses in the Day Division, Special Year students must be registered for a minimum of four full courses in a given year. Special Year students will register during the period set aside for fourth-year undergraduates, so as to increase the likelihood that the desired courses will be available. It must be clearly understood that satisfactory completion of the courses taken in a Special Year does not guarantee automatic admission to a graduate programme. Such students must apply, or re-apply, for admission to graduate studies during or after their Special Year. Their applications will be considered along with all other applications received at that time, and will not take priority over those of other

applicants who may be better qualified. Students in a Special Year will pay the regular undergraduate tuition.

7. Students who have been admitted to graduate study despite deficiencies in their undergraduate preparation may be required to register in up to three undergraduate courses in addition to the required graduate courses. When such undergraduate courses are taken during a regular academic year, they will be regarded as part of the work load of that year and no additional fees will be charged (except in the case of those programmes for which a per-course tuition fee has been established, where graduate students taking undergraduate courses will be charged the appropriate undergraduate course fee). Since there is no overall fee for the summer session, graduate students taking undergraduate courses during that session will be charged the appropriate undergraduate course fee.

8. Once a student has commenced a graduate programme, he must maintain continuous registration in each academic year until the degree is awarded, either by paying the appropriate tuition fee or by paying the non-resident registration fee of $10. Students who fail to register will be considered to have withdrawn from the programme.

9. Classification of students as full-time, half-time, or part-time :

   a. In programmes with a minimum residence requirement of one calendar year or less, students are clasified as *full-time* if, in their first year of graduate study, they register for more than one-half of the course work (including under-graduate courses, if any, as well as research and thesis courses) which is prescribed for the degree.

   b. In programmes with a minimum residence requirement of more than one calendar year, students are classified as *full-time* if, in their first year of graduate study, they register for more than one-half of the course work which is prescribed for Year I of the programme.

   c. Students are classified as *half-time* if, in their first year of graduate study, they register for one-half or less of the course work which is prescribed for the degree (or for Year I of the programme, in the case of programmes with a minimum residence requirement of more than one calendar year).

   d. Students in programmes with a per-course tuition fee are classified as *part-time* when they are registered in a given academic year for less than a normal programme of full-time work.

Financial Assistance

DEPARTMENTAL ASSISTANTSHIPS

Many departments in the University offer salaries for teaching assistance, demonstrating, and marking. The amount of salary paid varies from department to department and depends upon the amount of work involved. Students who are interested in obtaining assistance should inquire from the department concerned.

GOVERNMENTAL AID

Various levels and agencies of government offer loans, scholarships, fellowships and grants. Provincial assistance is usually based on residence requirements or service obligations.

Quebec :

Residents of the Province of Quebec are eligible for two kinds of assistance : *loan bursaries* based on financial need (Quebec's equivalent to the Canada Student Loan Plan) and *scholarships* based on academic achievement. The student applies for the loan-bursary at the beginning of term, and must have financial means of sustaining himself for at least the first few months until the loan is processed. The scholarships are granted for postgraduate studies, training of teaching personnel and social workers and must be applied for by mid-December. Students should address themselves to :

Service de l'aide aux étudiants,
Ministère de l'Education,
Hôtel du Gouvernement,
QUEBEC 4, Québec.

Other Provinces :

Ontario

Director of Student Awards,
Dept. of University Affairs,
481 University Ave.,
TORONTO 2, Ontario

Newfoundland

Canada Student Loans Authority,
Dept. of Education,
Confederation Building,
ST. JOHN'S, Nfld.

Prince Edward Island

Dept. of Education,
CHARLOTTETOWN, P.E.I.

Nova Scotia

Nova Scotia Canada Student Loans Committee,
Dept. of Education,
Box 578,
HALIFAX, Nova Scotia

British Columbia

The British Columbia Student Aid Loan Committee,
c/o Dept. of Education,
VICTORIA, B.C.

Yukon Territory

The Students Financial Assistance Awards Committee,
c/o Supt. of Schools,
Box 2703,
WHITEHORSE, Yukon Territory

New Brunswick

Deputy Minister,
Dept. of Youth & Welfare,
FREDERICTON, N.B.

Manitoba

Student Aid Officer,
Dept. of Education,
Legislative Buildings,
WINNIPEG, Manitoba

Saskatchewan

Dept. of Education,
Legislative Buildings,
REGINA, Saskatchewan

Alberta

Student Assistance Board,
Dept. of Education,
EDMONTON, Alberta

Northwest Territories

Supt. of Education for the Northwest Territories,
c/o Education Division,
Dept. of Northern Affairs and National Resources,
150 Kent St.,
OTTAWA, Ontario

Many government *departments* (e.g. the Department of the Solicitor General and the Department of Labour) offer financial assistance to graduates pursuing studies relating to the department's work. Also, government *agencies,* such as Central Mortgage and Housing Corporation, offer assistance.

Two major sources of aid to graduate students are the Canada Council and National Research Council, two government-supported organizations.

Canada Council

The Canada Council offers fellowships and grants in the Social Sciences and Humanities at the doctoral level and also in Fine Arts. Some of the programmes of aid are : Doctoral Fellowships, Post-doctoral Fellowships, Leave Fellowships, Research Grants, Arts Awards, Arts Bursaries, Short Term Grants, Travel Grants.

The "Arts" are defined as follows : architecture, the arts of theatre, literature, music, painting, sculpture, the graphic arts and other similar creative and interpretative activities. The "Social Sciences and Humanities" category can extend to undertakings of an interdisciplinary nature but not to those closely identified with the physical and biological sciences or with professional training.

Prospective applicants should write early in the year to The Canada Council, 140 Wellington Street, Ottawa 4, Ontario, selecting from the following categories :

Aid to Artists

For Art Awards and Bursaries : *Awards Service,* The Canada Council etc.

For Short Term Grants, Travel Grants, Grants for Materials : *Arts Division,* The Canada Council etc.

Aid to the Social Sciences and Humanities

For Fellowship applications : *Awards Service,* The Canada Council etc.

For Grants applications : *The Social Sciences and Humanities Division,* The Canada Council etc.

Application forms are generally available at the SGWU Guidance Library or Graduate Studies Office.

National Research Council

In general, the National Research Council supports research in science fields, including psychology, by granting funds to university departments and faculty. Prospective applicants should inquire of the Chairman of the department in which they wish to undertake graduate studies for information about financial assistance.

Commonwealth Scholarship and Fellowship Plan

At the request of the Government of Canada, the Association of Universities and Colleges of Canada provides a secretariat for academic administration of the Commonwealth Fellowship plan. This plan makes it possible for Canadians to undertake graduate study or research in many parts of the Commonwealth as part of a Canadian graduate degree programme, in addition to bringing graduate students from other Commonwealth countries to Canada.

Students from other Commonwealth countries, in Canada on *student visas,* may apply to their home country for these fellowships. Students with *landed immigrant status* may apply to any other Commonwealth country for these awards, with the understanding that they will return to Canada when their graduate work is completed.

The Awards Service of the Association of Universities and Colleges of Canada, 151 Slater St., Ottawa 4, Ontario, does not itself offer any awards but it does administer several national and international programmes on behalf of Canadian and foreign donors, both private and governmental. The Association will be happy to answer inquiries from students regarding financial aid.

There are several other programs which enable foreign students to come to Canada to study, sponsored by the Canadian International Development Agency, under the Department of External Affairs. These include the Columbo Plan, Economic Assistance to French-Speaking West Africa, Special Commonwealth Africa Assistance, Caribbean Assistance Program. Interested students apply through the Ministry of Education or through the appropriate government department in their own country.

FOUNDATIONS AND PRIVATE AGENCIES

Thousands of professional associations, foundations and companies offer financial support for the graduate student. Details about these can be found in the following publications which will be available in large public libraries, university reference libraries, consulate or embassy offices. At Sir George, see the Guidance Information Center, H-440.

Publications :

Awards for Graduate Study and Research — perhaps the most useful to Canadian students, lists several thousand awards available to Canadians and to those studying in Canada. Prepared by the Bureau of Statistics, it is available from the Queen's Printer, Ottawa, Ontario.

Study Abroad — A UNESCO publication lists awards tenable in Canada, as well as in other countries.

Fellowships and Scholarships Offered by Private Donors and Foreign Governments for Canadian Students — administered by the Association of Universities and Colleges of Canada, 151 Slater St., Ottawa 4, Ontario.

Fellowships in the Arts and Sciences — published by the American Council on Education.

Annual Register of Grant Support — lists major awards, most awarded by American agencies.

Grants Register — lists postgraduate awards in the English speaking world.

N.B. Students should investigate carefully possible sources of financial aid before coming to Sir George Williams University. Aid is available but seldom after classes have begun.

Grading System for Graduate Programmes

1. Grades designated for use in reporting graduate courses are HONOURS, SATISFACTORY, UNSATISFACTORY, AUDIT, IN PROGRESS, or LATE.
   a. HONOURS is reserved for work of exceptional merit in the course.
   b. SATISFACTORY designates acceptable graduate-level work in the course.
   c. UNSATISFACTORY means work below an acceptable standard in the course. When a student receives an UNSATISFACTORY grade in any course taken as part of his graduate programme, it shall be the responsibility of the department to recommend to the Board of Graduate Studies whether or not he should be permitted to continue in the programme. If he is permitted to continue, he shall either repeat the course in question or take an alternative course, as recommended by the department.
   d. AUDIT may be used at the discretion of the student. A course taken for this grade must be so designated at the beginning of the term. Such a course will not count toward the completion of any graduate degree. A student may take any such course for which he is adequately prepared. The student is expected to attend class but is not expected to complete assignments or participate in examinations.
   e. IN PROGRESS is used when the work of a course normally extends past the time for reporting grades. It will be converted to Honours, Satisfactory, or Unsatisfactory within a time limit set by the department, not to exceed one year.
   f. LATE may be used at the option of the instructor when the work in a course has not been completed on time. It will be converted to Honours, Satisfactory, or Unsatisfactory if all required work is submitted prior to a prescribed deadline; it will automatically be converted to Unsatisfactory if the deadline is not met. The deadline will be set by the instructor in each case, but may not be later than April 1 in the case of first-term half courses, or September 1 for all other courses.
2. Any undergraduate course taken by a graduate student as an intrinsic part of his graduate programme is graded as above rather than by the undergraduate grading system.
3. Language proficiency examinations and comprehensive examinations are graded either PASS or FAIL. A student who receives a failing grade in a comprehensive examination may be permitted to present himself for a second examination. A student who received a failing grade in a language proficiency examination may be permitted to make no more than two further attempts to satisfy the requirement.
4. A thesis is graded either ACCEPTED or REJECTED.
5. No supplemental examinations are permitted in courses taken as part of a graduate programme.
6. Within two weeks of the release of grades, a student may request of the Chairman of the Board of Graduate Studies that a grade be re-evaluated.

Awarding of Degrees

Degrees are awarded at either the Spring Convocation in May, or the Fall Convocation in November. The following deadlines must be met :

1. No later than four weeks prior to the date of convocation, the department (or Faculty, in the case of Engineering and Commerce) must certify to the Dean of Graduate Studies that the candidate has successfully completed all requirements for the degree.

2. In programmes requiring a thesis, three copies of the final typed version of the thesis, prepared in accordance with the regulations set forth below, must be submitted to the Office of the Dean of Graduate Studies no later than eight weeks prior to the date of convocation.

3. Each department will set such earlier deadlines for the submission of a draft copy of the thesis as may be necessary in order to allow time for approval by the student's thesis advisor prior to final typing.

Thesis Regulations

1. Three copies must be submitted (one original, and two carbon or xerox copies). When the degree has been granted, these will be bound at the student's expense; two will be deposited in the University library and one will be given to the student's thesis advisor. An allowance is made for the cost of thesis binding in the master's degree graduation fee. If a student wishes to have a fourth copy of a master's thesis bound for his personal use, it should be submitted at the same time, accompanied by a cheque for $5.00 payable to Sir George Williams University. Candidates for a doctoral degree are required to pay the actual cost of thesis binding in addition to the doctoral graduation fee.

2. Where a thesis or thesis-equivalent consists in whole or in part of non-typescript material (film, slides, videotape, etc.), only one copy of such non-typescript material must be submitted. Clearly, all typescript material must still be submitted in three copies.

3. Each thesis must be accompanied by three copies of an abstract, typed on a separate single sheet, with the name of the author, the title of the thesis, and a summary not exceeding 150 words.

4. *Manner of Preparation :*

a. The thesis must be typewritten on high-quality bond paper, 8½ x 11 inches. The thesis must be typed double-space, in a standard type-face, on one side of the paper only, with a 1½ inch left-hand margin, and a one inch margin at the top, bottom, and right. In the case of carbon copies, the second copy should be on the same quality paper as the original; the third copy may be on onionskin paper.

b. Pages must be numbered consecutively and arranged in the proper order.

c. The thesis must be free from typographical errors. Corrections in ink are not acceptable.

d. Theses must be prepared in accordance with the principles set forth in Kate L. Turabian, *A Manual for Writers of Term Papers, Theses and Dissertations (University of Chicago Press).* For special problems not covered in this abbreviated manual, students should consult *A Manual of Style (University of Chicago Press).*

e. The typed pages should be placed in spring binders and should not be punched or mutilated in any way.

f. Theses which do not meet the above specifications will be returned for correction, with consequent delay in the granting of the degree.

g. For further details please check with the Office of Graduate Studies.

5. Candidates are advised that the final typing of the thesis should not be undertaken until the final draft has been approved by the thesis advisor.

6. When a graduate student submits his thesis to the Office of Graduate Studies he will be required to fill out a form from the National Library of Canada concerning microfilming of theses.

Resubmission of Theses

If a thesis is rejected it may be submitted again, in revised form, only once. It should be noted that theses may be rejected on the grounds of poor form as well as on academic grounds.

TUITION FOR GRADUATE PROGRAMMES

M.A. in Art Education, Economics, English, History, Psychology (General-Experimental), and Religion (History and Philosophy);
M. Sc. in Biology, Chemistry and Physics

Tuition for full-time students during their first academic year (i.e., fall and winter term) :	$400.00
Tuition for half-time students during each of their first two academic years :	$250.00
Tuition for each additional academic year (beyond the first full-time year or the first two half-time years) during which a student makes use of University facilities (i.e., library, laboratories, or consultation with faculty), whether or not he is registered for course work :	$ 50.00
Tuition for a graduate course in History during a summer session :	$150.00
Tuition for a graduate course in English during a summer session :	$100.00

M.A. in Psychology (Applied Psychology) and Religion (Judaic Studies)

Tuition for full-time students during Year I of the programme :	$400.00
Tuition for full-time students during Year II of the programme :	$300.00
Tuition for half-time students during Year I of the programme, for each of two half-time years :	$250.00
Tuition for half-time students during Year II of the programme, for each of two half-time years :	$175.00
Tuition for each additional academic year (beyond the first two full-time years or the first four half-time years) during which a student makes use of University facilities (i.e., library, laboratories, or consultation with faculty), whether or not he is registered for course work :	$ 50.00

M.A. in Education (Educational Technology)

Tuition for pre-programme work in special summer session — per course :	$100.00
Tuition for full-time students during Year I of the programme :	$400.00
Tuition for full-time students during Year II of the programme :	$300.00
Tuition for full-time students during each additional academic year (beyond the first two full-time years) during which a student makes use of University facilities (i.e., library, laboratories or consultation with faculty), whether or not he is registered for course work :	$ 50.00
Tuition for part-time students — per course :	$100.00
Tuition for part-time students — per half-course :	$ 50.00

Master in the Teaching of Mathematics

Tuition — per course :	$100.00
Tuition for students who are making use of university facilities (i.e. library, laboratories, or consultation with faculty) to complete unfinished course work (i.e. In Progress grades, thesis), but who are taking no new courses :	$ 50.00

Master of Engineering

Tuition — per half-course or half credit :	$ 50.00
Total fee for graduate course work and dissertation requirement :	$700.00
Tuition for students who are making use of university facilities (i.e. library, laboratories, or consultation with faculty) to complete unfinished course work (i.e. In Progress grades, thesis), but who are taking no new courses :	$ 50.00

Master of Business Administration

Tuition — per half-course	$ 65.00
Maximum fee for full-time student per academic year	$650.00

Tuition for students who are making use of university facilities (i.e. library, laboratories, or consultation with faculty) to complete unfinished course work (i.e. In Progress grades, thesis), but who are taking no new courses :	$ 50.00

Doctor of Philosophy (Ph.D.) and Doctor of Engineering (D.Eng.)

Tuition for full-time students during each of their first two academic years beyond the master's degree, or their first three academic years beyond the bachelor's degree if permitted to register for doctoral studies without first completing a master's degree :	$400.00
Tuition for half-time students (when applicable) during each of their first four academic years beyond the master's degree, or their first six academic years beyond the bachelor's degree if permitted to register for doctoral studies without completing a master's degree :	$250.00
Tuition for each additional academic year (beyond the first two full-time years or the first four half-time years after the master's degree) during which a student makes use of University facilities (i.e., library, laboratories, or consultation with faculty), whether or not he is registered for course work :	$ 50.00

Miscellaneous Graduate Fees

Non-resident registration fee (applies only when student is making no use of University facilities) :	$ 10.00
Application fee (payable in cash, certified cheque, or money order) :	$ 10.00
Registration deposit (per course)	$ 10.00
Late registration fee :	$ 10.00
Master's degree graduation fee when no thesis is required :	$ 10.00
Master's degree graduation fee when thesis is required (includes thesis binding) :	$ 25.00
Graduation fee for Ph.D. or D.Eng. (does *not* include thesis binding) :	$ 25.00
Graduating Class Fee (determined annually)	
Fee for re-submission of master's thesis :	$ 25.00
Fee for re-submission of doctoral dissertation :	$ 50.00
Fee for language supplemental examination :	$ 10.00
Student Services Fee	
Full Time, Partial :	$ 14.00
Half Time, Part Time :	$ 4.00

Withdrawals

Any student who withdraws from a course or from the University is required to notify the Registrar's Office in person or in writing and to give reasons for withdrawing. No withdrawals will be accepted after February 15 (October 26 for Fall-term half-courses). Withdrawal from classes does not entitle a student to refunds of fees or cancellation of contract, except as provided below.

Contract Adjustments and Refunds

1. Applications by graduate students for contract adjustments must be presented no later than four weeks after the beginning of the academic year in September, or when Winter-term half-courses are involved, no later than the end of the second week of classes in the Winter term.

2. Adjustments may be made, with permission of the Treasurer's Office, in the following circumstances :

   A. *In programmes for which tuition is assessed on flat-rate basis :*

   When an individual who had originally registered as a full-time graduate student withdraws within the time limit from enough courses so as to change his classification from full-time to half-time or part-time, as defined in paragraph 9 of the general regulations above, his tuition will be adjusted to the appropriate half-time or part-time fee.

   B. *In programmes for which tuition is assessed on a per-course basis :*

   When for personal reasons, a graduate student withdraws within the time limit from some but not all of the courses for which he had registered during a given academic year, he shall be entitled to a refund of 75% of the tuition fee applicable to the courses from which he is withdrawing.

   C. *In any graduate programme,* when a student withdraws entirely from the programme no later than four weeks after the beginning of the academic year in September, he shall be entitled to a refund of 75% of the tuition fee for which he originally contracted.

   D. When a student is not allowed to continue in a graduate programme beyond the end of the Fall term, on grounds of unsatisfactory performance in Fall-term half-courses :

   1. in programmes for which tuition is assessed on a flat-rate basis, he shall be entitled to a refund of 25% of the total tuition fee applicable to the entire academic year;
   2. in programmes for which tuition is assessed on a per-course basis, he shall be entitled to a refund of 75% of the tuition fees applicable to Winter-term half-courses, and/or 25% of the tuition fees applicable to full courses.

3. Failure to attend classes shall not be considered a cancellation of contract.

4. In the event that the University grants a refund, the following fees are not refundable, viz. : application fee; registration deposit, students' services fee.

Failure to make payments of tuition, fees, or other amounts owed the University, when they fall due, or to arrange for such payments before their delinquent dates, is considered sufficient cause, until the debt has been adjusted with the Treasurer's Office, to (1) bar the student from classes or examinations, and/or (2) withhold diploma or transcript of record.

DEPARTMENT OF ECONOMICS

Professor of Economics, and Chairman of the Department

Arthur Lermer, M.A. (Toronto)

Professors

Muriel Armstrong, M.A. (McGill)
Paul Bairock, Ph.D. (Université Libre de Bruxelles)
Ajit K. Dasgupta, Ph.D. (Cambridge)
Morido Inagaki, Ph.D. (Rotterdam)
John W. O'Brien, Ph.D. (McGill)
Shreekant A. Palekar, Ph.D. (Harvard)

Visiting Professors/Associate Professors

Jaleel Ahmad, Ph.D. (M.I.T.)
George G. Davidovic, Lic. (Geneva)
Herbert Glejser, Ph.D. (Brussels)

Associate Professors

George Lermer, M.A. (McGill)
Balbir S. Sahni, Ph.D. (New School for Social Research)
Abraham Tarasofsky, Ph.D. (McGill)

Assistant Professors

A. Anastasopoulos, M.A. (Rochester)
Benson S. Brown, Ph.D. (Berkeley)
Andre Martens, Ph.D. (Université Libre de Bruxelles)
Peter Miles, Ph.D. (McGill)
Morton Stelcner, Ph.D. (Syracuse)

Lecturers

Robert N. Rand, M. Phil (Yale)
Barry D. Rosenfeld, M.A. (Pennsylvania)

Special Professors (on part-time appointment)

Marcel G. Dagenais, Ph.D. (Yale)
Benjamin H. Higgins, Ph.D. (Minnesota)

The Department of Economics at Sir George Williams University offers an opportunity for study and research leading to the degree of Master of Arts and Ph.D. in Economics.

The programme is offered in the late afternoon and evening, making it available to both full-time and part-time students concurrently. However, the programme limits new enrollment to a small number to ensure high calibre in students and close contacts for them with members of the faculty. Most classes are small, thus permitting active participation.

Emphasis of the curriculum in the Department of Economics is on economic theory, economic development and planning, quantitative methods, economics of public sector, economic history and labor economics. The programme is also designed to provide the student with flexibility in setting up a course of study to suit his own interests.

The Department recommends that students acquire a working knowledge of the application of mathematical tools to economic analysis.

MASTER OF ARTS IN ECONOMICS

Admission Requirements

An Honours degree in Economics, or its equivalent. Applicants with deficiencies in their undergraduate preparation may be required to take up to three undergraduate courses in addition to their regular graduate programme.

Requirements for the Degree

1. The minimum period of residence for a full-time student is one academic year. A full-time student must take a minimum of two full courses and two half-courses during a given year. A part-time student may not take more than two full courses (or equivalent) in a given year.

2. A fully qualified candidate is required to take two compulsory full courses and two half-courses selected from the optional seminars.

3. A comprehensive examination must be taken in micro economics, macro economics, and one other selected area. The comprehensive examination, conducted by a special examining board, may be either oral or written. The examining board will consist of at least three members of the department in addition to the Chairman of Graduate Studies in Economics.

4. Each student must either submit a thesis, prepared under the guidance of a member of the department, or take two additional half-courses. If the thesis option is chosen, the topic of the thesis must be approved by the research committee of the department. Each completed thesis will be graded by the student's thesis advisor and at least one other examiner. The latter may be a specialist from outside the department or the University.

DOCTOR OF PHILOSOPHY IN ECONOMICS

Admission Requirements

Students with an M.A. in Economics from a recognized university.

Students with a high standing in a Master's degree (or equivalent) in other fields such as commerce, mathematics, business administration, etc. from a recognized University, may be admitted subject to the satisfactory completion of qualifying requirements, if any.

Students enrolled in the Master's programme in Economics at this University and who have completed the minimum course requirements for the Master's Degree with "Honours" grades, may apply for permission to proceed directly to doctoral studies without submitting a Master's thesis.

Students with a B.A. (Honours) or equivalent high standing in Economics may apply for admission directly to doctoral studies.

Requirements for the Degree :

1. The minimum period of residence is two calendar years of full-time graduate study beyond the master's degree, or three calendar years of full-time graduate study beyond the bachelor's degree for those students who are permitted to enroll for doctoral studies without completing a master's degree, or the equivalent in half-time study. A period of full-time study allowed or required by the Department to be spent at another institution with adequate research facilities may be offered towards a partial fulfillment of the residence requirements for a Ph.D. of Sir George Williams University. In each case, the Department must obtain approval of the Board of Graduate Studies.

2. Course Requirements :

All Ph.D. candidates must take an equivalent of a total of 6 full (or 12 one-term) graduate courses beyond the B.A. level, as follows :

Compulsory :

Micro-economics (one full-year course)
Macro-economics (one full-year course)

Optional :

Eight one-term graduate seminars (equivalent to four full-year courses) selected from the Departmental offerings.

Graduate courses completed with an "Honours" or equivalent grade for M.A. at this or another university may be offered towards a partial fulfillment of the course requirements for the Ph.D. degree.

3. Examinations Required :

A. *Course Examinations :* Every Ph.D. candidate must pass examinations in all the courses required of him by the Departmental Graduate Studies Committee.

B. *Examination in Quantitative Methods and Research Techniques :* In addition to the course requirements, every Ph.D. candidate must pass this examination before taking the Ph.D. General Examination.

C. *Ph.D. General Examination :* All candidates who have fulfilled the course requirements of the Programme must pass the Ph.D. General Examination before they are allowed to write their dissertation. The Ph.D. General Examination shall be set up and read by at least three members of the Department. It will consist of three written examinations covering three fields as follows :

One Compulsory Field : General Economic Theory (Micro-economics and Macro-economics).

Two Optional Fields : Any TWO from the list of the optional graduate seminars that may be offered by the Department at the relevant time.

D. *Language Requirements :* All candidates shall take examinations in French and in one other modern language approved by the Department.

4. Dissertation Requirements :

A candidate who has passed the Ph.D. General Examination must transmit in writing to the Graduate Studies Committee a detailed proposal of his dissertation subject. The proposal may state his preference, if any, for a member of the Department to be his research supervisor. The candidate shall proceed to work on his dissertation only after he has obtained the necessary approval from both the Departmental Graduate Studies Committee of his field of research and his research supervisor.

The dissertation shall be read and evaluated in writing by a Dissertation Committee consisting of the research supervisor and two other members within the Department. If, in the majority opinion of the examiners, the dissertation needs to be revised, then it shall be returned to the candidate who shall be informed in writing of the nature of revisions required before resubmitting it. The Departmental Graduate Studies Committee shall invite a suitable expert from outside the Department to evaluate the dissertation before the candidate appears for the oral defense of his dissertation.

The candidate shall defend his dissertation before a committee consisting of at least 5 members including 3 members of the candidate's dissertation committee, the chairman of the department and the chairman of the Graduate Studies Committee. The Graduate Studies Committee may appoint one or more experts from outside the Department to be a member of the committee before whom the candidate appears for the defense of his dissertation.

COURSES

(a) Compulsory Courses (Full year)
Economics 610 — Micro Economics
Economics 650 — Macro Economics

(b) Optional Seminars (One-term) — Under the following classification.

Economics 614-623 — Topics in Co-operative Economy.
(*) **Economics 615** — Seminar in Economics of Co-operatives.

Economics 624-633 — Topics in Development Planning Techniques and Analysis.
Economics 625 — Seminar in Development Planning.
Economics 626 — Seminar in the Theory of Growth.
(*) **Economics 627** — Seminar in the Theory of Optimal Growth.
Economics 628 — Seminar in Cost-Benefit Analysis.

Economics 634-643 — Topics in Area Studies
Economics 635 — Seminar in Area Studies in Economic Development.
(*) **Economics 636** — Seminar in Economic Planning in the West.

Economics 644-653 (**) — Topics in Economic History.
(*) **Economics 644** — Special Topic in Economic History.
Economics 645 — Seminar in Economic History.

Economics 654-663 — Topics in Public Economy.
Economics 655 — Seminar in Public Finance and Fiscal Policy.
(*) **Economics 656** — Seminar in Economics of the Public Sector.

Economics 664-673 — Topics in International Economics.
Economics 665 — Seminar in International Trade.

Economics 674-683 — Topics in Labour Economics, Industrial Relations and Manpower Planning.
Economics 675 — Seminar in Labour Economics.
(*) **Economics 676** — Seminar in Industrial Relations.
(*) **Economics 677** — Seminar in Educational and Manpower Planning.

(*) Not offered during 1970-71.
(**) Except Economics-650.

Economics 684-693 — Topics in Mathematical Economics and Econometrics

(*) **Economics 685** — Seminar in Mathematical Economics.

Economics 686 — Seminar in Econometrics.

Economics 694-697 — Topics in Monetary Economics.

Economics 695 — Seminar in Monetary Theory and Stabilization Policy.

Economics 698 — A Reading Course in Economics.

Economics 699 — Seminar on a Special Topic.

Economics 610, Micro Economics

A course in micro-economics which will solidify, and enlarge the scope of the student's undergraduate training. Early and contemporary contributors to micro-economic theory are studied. Modern analysis is applied to a critique of some aspects of the history of economic thought. Traditional and modern formulation of consumer behaviour theory, the theory of the firm, the theory of markets and welfare economics are studied.

Methodological problems in economic theory, and in particular, the distinction between dynamic and static analyses, is stressed. Some modern techniques of analysis are covered. For example, in the theory of the firm, 'linear programming' and 'decision theory' and 'input-output' analysis are included as part of the theory of markets. (Full course)

Economics 650, Macro Economics

An advanced treatment of macro-economic analysis, Classical, Keynesian, and post-Keynesian formulations are studied in both static and dynamic settings.

Special emphasis is placed on relevant aspects of monetary theory, business cycle and the theory of growth. Empirical findings are incorporated to assess these theories in retrospect.

The theoretical presentation and evaluation are supplemented by a discussion of various policy implications. (Full course)

Economics 625, Seminar in Development Planning

The general purpose of this seminar is to introduce various problems raised by quantitative development planning and to study the techniques by which they can be dealt with. Two problems will be given special attention : The construction of a realistic growth model and the definition of a rational development strategy.

(*) Not offered during 1970-71.

Every year, these problems will be discussed with respect to a particular sector of development planning : e.g. economic, social, international, industrial, agricultural, etc. (Half-Course).

Economics 626, Seminar in the Theory of Growth

This seminar analyses models of growth which can be used for development planning of the developing economies. Various types of models will be studied, starting with the simple one-scarce-factor-one-sector models and extending to the multi-factors-multi-sectors models. Among the specific topics to be discussed are the problems of technological change, gestation periods, factor substitution, accounting prices, and inter-industry deliveries.

In this seminar only elementary mathematics will be used. (Half-course).

Economics 628, Seminar in Cost-Benefit Analysis

This is a seminar in the theory and application of cost-benefit analysis. Special emphasis will be laid on the following topics : cost-benefit analysis and welfare economics; budget constraints; accounting prices; the social rate of discount; and the appraisal of projects involving risk and uncertainty. The applications of cost-benefit analysis for social planning e.g. in health, education and water-pollution will be discussed as well as its use in private industry.

Members of the Seminar will be expected to participate actively in a number of research projects in progress applying cost-benefit analysis to specific problems.

Economics 635, Seminar in Area Studies in Economic Development

This seminar approaches the problem of development planning from the empirical side. It reviews the post-war socio-economic development of different areas of the world and analyses actual development plans from the international, national, regional and sectorial point of view. The discussions will relate to the essential characteristics of such plans, as well as their sociological, institutional and political background. An attempt will be made to assess and compare the results of different plans and to determine the relative importance of the factors which have led to their respective success or failure. (Half-course).

Economics 645, Seminar in Economic History

The relationship between economic theory, especially principles of economic development and history will be traced. Problems of

methodology and research programming in economic history will be thoroughly covered. Selected case studies of most significant and dynamic economies will be historically treated. (Half-course).

Economics 655, Seminar in Public Finance and Fiscal Policy

An analysis of the public revenue and expenditure and its effects on the economy. (Half-course).

Economics 665, Seminar in International Trade

Classical and general models of international trade. Classical comparative cost theory and the Heckscher — Ohlin model; Inter-regional and inter-group trade, and the pure theory of exchange; Factor movements, prices and supplies, and the opportunity-cost controversy revisited. Offer curves from Marshall to Meade. Welfare analysis in foreign trade theory. (Half-course).

Economics 675, Seminar in Labour Economics

A study of contemporary theoretical and practical issues in the labour field including an analysis of the significance of pure competition and monopoly in wage determination; the modern theory of income determination and distribution; issues in the theoretical relations between wages, prices and employment; Phillips Curve, labour's share of national income, Cobb-Douglas and other production functions — relation between wages, profits and productivity.

During 1970-71 a number of visiting scholars will conduct sessions on specific topics. (Half-course).

Economics 686, Seminar in Econometrics

A course in econometrics that will cover some of the literature in the field, and in addition will concentrate on a particular project each year. (Half-course).

Economics 698, A Reading Course in Economics

Supervised reading in a specialized area in which no seminar is offered by the Department. (Half-course).

Economics 699, Seminar in Selected Topics (Half-course).

In addition, graduate students in Economics may be permitted to register for a limited number of courses, which are offered in the M.B.A. programme. In all such cases prior permission of the Department of Economics and the Faculty of Commerce is required.

DEPARTMENT OF EDUCATION

Professor of Education, and Chairman of the Department
John Macdonald, Ph.D. (Glasgow)

Associate Professors
Harold Entwistle, Ph.D. (London)
John L. Harrison, Ph.D. (Manchester)

Assistant Professors
Mark Braham, M.A. (Illinois)
Martha Crampton, M.A. (Bryn Mawr)
Jitendra Bhatnagar, Ph.D. (London)
Frances Friedman, M.A. (Columbia)
P. David Mitchell, M.A. (Dalhousie)

CENTRE FOR INSTRUCTIONAL TECHNOLOGY

Director and Assistant Professor
George A. B. Moore, M.A. (Syracuse)

Assistant Professors
Gary Boyd, Ph.D. (British Columbia)
Stephen Ford
C. Rodney James, Ph.D. (Ohio State)

Lecturer
John E. Harrison

Sessional Lecturers
To be announced.

The Department of Education, in collaboration with the Centre for Instructional Technology of Sir George Williams University, offers a programme of study leading to the degree of Master of Arts in Education in the field of Educational Technology. The programme is offered in the day and evening, to permit the attendance of both full-time and part-time students.

The programme is designed to prepare *professional educators* in either of two areas of concentration :

Option A : Research in and Development of Educational Media (teaching machines, computer-assisted instruction, instructional systems, film, television, etc.);

Option B : Educational Television and Film.

The intention of the programme is to introduce a high degree of professional and academic competence into the rapidly developing

field of educational technology. This is a field which is having a major impact upon educational theory, teaching, learning, curriculum design and school organization.

Admission Requirements

Entry into the programme is based on the individual backgrounds of applicants, who should possess a Bachelor's degree with at least a major or the equivalent in a subject having direct relevance to education. An average of at least B in the major or equivalent is required. The possession of a permanent teaching certificate is desirable if one plans to work in a school system. Promising candidates who lack an appropriate pattern of undergraduate work in education and allied subjects will usually be required to complete either a pre-programme summer session or additional courses in the academic year prior to entry into the programme. Students who are residents of Quebec will be required to satisfy a bilinguality criterion before the degree is awarded.

Special Pre-Programme Summer Session

The pre-programme summer session will run for approximately six weeks from the end of June each year. No more than two courses may be taken in any one summer. Equivalents of some of these courses are given during the regular academic year and may be taken upon permission of the Chairman of the Department of Education in the year prior to admission to the programme.

The following courses are offered :

702 - Education 212. The Nature and Function of Teaching*
702 - Education 213. Basic Psychological Processes*
702 - Education 421. Sociology of Education* (cross-reference — Sociology 448)
702 - Education 431. History of Educational Ideas*
702 - Education 411. Philosophy of Education*
702 - Education 214. Statistical Method in Psychology and Education.*

*Note : These courses were formerly listed as Education 501, 502, 503, 504, 505 and 506.

Requirements for the Degree

1. The programme is open to full-time and part-time students without preference. Candidates who are practising teachers are encouraged to take a leave of absence from their schools for at least one academic year.

2. Full-time students may complete the academic requirements for the degree in a minimum of two academic years. Part-time students may not take more than four full courses, including two summer courses, in a calendar year. Students who follow Option B : Educational Television and Film must attend full-time in their final year of study.

3. Every student will be required to undertake a supervised internship with an approved educational media agency for a minimum of three months. Full-time students will usually undertake their internship during the summer following the first year of the programme. Part-time students will usually undertake their internship after completing four full courses or their equivalent.

4. Students who are residents of Quebec will be required to satisfy a bilinguality criterion, defined as a good working knowledge of spoken French. Students will normally demonstrate their ability to meet this criterion prior to their internship assignment, but in any case they will be required to do so before the degree is awarded. An official test will be waived for those students who register in French 211 and pass the course.

5. A fully-qualified candidate is required to take the equivalent of six and one-half full courses during the two years of his programme (plus the thesis or thesis-equivalent). The individual course of study will be decided in consultation with the advisor though certain common-core courses are recommended for all students.

6. Students who follow Option A : Research in and Development of Educational Media will be required to write a thesis : they will register for *Education 691 : Thesis* in the year in which they undertake their work on the thesis. Students who follow Option B : Educational Television and Film will be required to prepare a complete educational television or film production as a thesis-equivalent; they will register for *Inst. Comm. 690 : Thesis-Equivalent* in the year in which they are preparing the thesis-equivalent.

RECOMMENDED COURSES

Option A : Research in and Development of Educational Media

Education 601
Education 602 or 603 or 604
Inst. Comm. 601
Inst. Comm. 602

Electives : Seven half-courses or equivalent (to be chosen from the following list in consultation with Graduate Studies Advisor).

Option B : Educational Television and Film

Education 601
Education 602 or 603 or 604
Inst. Comm. 667
Inst. Comm. 668

Electives : Seven half-courses or equivalent (to be chosen from the following list in consultation with Graduate Studies Advisor).

COURSES

Education 601 (651, 652) Education and the Nature of Man

Education 602 (653, 654) Psychological Theory

Education 603 (655, 656) Sociology and Social Psychology of Education
Special Subject, 1970-71 : Social Psychology of Education

Education 604 (657, 658) Seminar and Workshop in Human Communication

Education 605 (659, 660) Problems in Curriculum and Instruction
Special Subject, 1970-71 : To be announced.*

Education 606 (661, 662) Studies in Research Methodology for Education
Special Subject, 1970-71 : Quantitative Methods in Educational Research.*

Education 607 (663, 664) Problems in Educational Systems Analysis and Planning
Special Subjects, 1970-71 : Systems Analysis*, The Concept of Educational Planning.*

Education 608 (665, 666) Studies in Educational Information Systems
Special Subject, 1970-71 : Educational Simulation and Gaming.*

Education 609 (667, 668) Problems in Educational Innovation
Special Subject, 1970-71 : To be announced.*

Education 610 (669, 670) Advanced Readings and Research in Educational Technology.
Special Subject, 1970-71 : To be announced.*

Education 691 Thesis

Inst. Comm. 601 (651, 652) Studies in the Foundations of Instructional Communications.
Special Subject, 1970-71 : The History and Development of Instructional Communications.*

Inst. Comm. 602 (653, 654) Studies in Communication Theory.
Special Subject, 1970-71 : Educational Cybernetics.*

Inst. Comm. 603 (655, 656) Theory of the Moving Image
Special Subject, 1970-71 : Film and Television Theory.*

Inst. Comm. 604 (657, 658) Studies in Development and Management.
Special Subject, 1970-71 : Administration of Media Programmes for Educational Institutions.*
By special arrangement with the Centre for Instructional Technology.

Inst. Comm. 605 (659, 660) Studies in Applied Systems Theory
Special Subject, 1970-71 : Computer Based Systems.*

Inst. Comm. 606 (661, 662) Studies in Applied Art for Instructional Communication.
Special Subject, 1970-71 : Graphics.*

Inst. Comm. 607 (663, 664) Special Issues in Instructional Communications.
By special arrangement with the Centre for Instructional Technology.

Inst. Comm. 610 (665, 666) Seminar on Research and Writing for Media.
Special Subject 1970-71 : Scriptwriting for Television and Radio.*

Inst. Comm. 611 (667, 668) Laboratory in Television Production and Evaluation for Education.
Full Course for TV Option Students.
Half-Course for others.

Inst. Comm. 613 (669, 670) Laboratory in Motion Picture Production and Evaluation. (Offered both as a full course and a half-course depending on the needs of the individual student).

Inst. Comm. 614 (671, 672) Laboratory in Instructional Communications.
By special arrangement with the Centre for Instructional Technology.

Inst. Comm. 615 (673, 674) Laboratory in Animation and Computer Graphics.
Special Subject, 1970-71 : Film Animation.*

Inst. Comm. 616 (675, 676) Television Workshop.
By special arrangement with the Centre for Instructional Technology.

Inst. Comm. 620 (677, 678) Field Study in Instructional Communications.
By special arrangement with the Centre for Instructional Technology.

Inst. Comm. 690 Thesis Equivalent.

N.B. Course listings for 1970-71 are tentative, and may change without notice. Those marked with an asterisk are half-courses.

Applications must be received no later than March 31, 1971.

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1 Courses listed are identified by three numbers, two of which are in brackets. If a full course is offered, the number applied to it for purposes of registration and transcript accreditation is the first number. When a half-course is offered, rather than a full course, the number applied to it is the first of those included within brackets. A student who is permitted to take a second half-course offered under the same course heading as that under which he has previously been registered, will register under the second of these bracketed numbers and be accredited accordingly. Except in extraordinary cases, a student will be permitted to take no more that a total of two half-courses and one full course under the same heading.

DEPARTMENT OF ENGLISH

Professor of English, and Chairman of the Department
Sidney Lamb, B.A. (McGill)

Professors
Douglass Burns Clarke, M.A. (McGill)
Neil Compton, M.Litt. (Cambridge)
Wynne Francis, M.A. (McGill)
Rachel Wasserman, Ph.D. (Cornell)

Visiting Professor
Matthew J. Hodgart, M.A. (Cambridge)

Associate Professors
Henry E. Beissel, M.A. (Toronto)
Roslyn Belkin, M.A. (Montreal)
Michael Brian, M.A. (Montreal)
Audrey Brune, M.A. (Chicago)
Mervin Butovsky, M.A. (McGill)
Howard R. Fink, Ph.D. (London)
Malcolm B. Foster, M.A. (Minnesota)
John B. Friedman, Ph.D. (Michigan)
Michael M. Gnarowski, Ph.D. (Ottawa)
Stanton de Voren Hoffman, Ph.D. (Penn.)
L. Elizabeth MacLean, M.A. (Smith)
David B. McKeen, Ph.D. (Birmingham)
G. David Sheps, M.A. (Cornell)
Richard J. Sommer, Ph.D. (Harvard)
Rytsa Tobias, B.A. (S.G.W.)

Assistant Professors
Gerald M. Auchinachie, M.A. (Toronto)
Roger Bird, Ph.D. (Minnesota)
Clark L. Blaise, M.F.A. (Iowa)
George Bowering, M.A. (U.B.C.)
David Ketterer, Ph.D. (Sussex)
Leonard R. Mendelsohn, Ph.D. (Wisconsin)
Edward Pechter, Ph.D. (Berkeley)
Lewis J. Poteet, Ph.D. (Minnesota)
Abraham Ram, M.A. (McGill)
Anne M. Stokes, M.A. (St. Michael's Vt.)

Visiting Assistant Professors
David Ketterer, Ph.D. (Sussex)
Yvonne M. Klein, M.A. (Minnesota)

Admission Requirements

An Honours degree in English or its equivalent. Applicants may be required to write a comprehensive entrance examination

before final acceptance. Students with deficiencies in their undergraduate preparation or in portions of their entrance examination will be required to take up to three undergraduate courses as part of their graduate programme.

Each student accepted will be assigned a Faculty advisor who will serve as his liaison with the departmental Committee on Graduate Studies. Once he has been assigned a thesis supervisor, the supervisor assumes the responsibilities of his advisor.

Degree Requirements

1. A fully qualified candidate is required to take four 600 level full courses, or the equivalent in a combination of full courses and half-courses, not including English 690 (Thesis). English 611 must be among the courses taken.

2. Each student must demonstrate his ability to read and translate an ancient or modern language other than English relevant to his academic programme; the language must be approved by the departmental Committee on Graduate Studies, which will supervise the test. The exceptional student who is well prepared in a field other than English Literature, relevant to his special interests in English studies, may make petition to the Committee through his advisor that he be allowed to substitute competence in that field for the language requirement. The petition must be granted at least eight months before the date at which submission of his thesis is due. The Committee will specify how his competence is to be tested.

3. A comprehensive oral examination must be taken after his thesis has been accepted.

4. Each student will be required to submit a thesis on a topic chosen in consultation with his advisor and approved by the departmental Committee on Graduate Studies. A student will register for **English 690 (Thesis)** in the year in which he expects to undertake his work on the thesis. Three copies of the thesis in its final form must be submitted by the student to the Office of Graduate Studies at least two months before the convocation at which the degree is to be conferred. Two copies of the thesis will be deposited in the library and the third copy will be given to the department after the thesis has been approved by the examiners and thus accepted. The details of the format to be used in preparing a thesis for submission are set out on page 19 of this announcement.

A thesis which has been judged unacceptable and thus rejected may be submitted once more in a revised form. The fee for resubmission of a thesis is twenty-five dollars.

GRADUATE PROGRAMME COURSES OFFERED :

English 611 (660,661)
Department Seminar
Special Subject 1970-71
Literary Study and Modern Culture*
Professor Neil Compton

English 622 (662,663)
Medieval Studies
A. Special Subject 1970-71
Studies in Medieval Allegory*
B. Special Subject 1970-71
The Poetry of Medieval Scotland*
Associate Professor John Friedman

English 623 (664,665)
Studies in the Renaissance
Special Subject 1970-71
Structure as Metaphor in Sidney and Shakespeare*
Associate Professor David McKeen

English 624 (666,667)
Studies in Eighteenth-Century Literature
Offered in 1970-71*
Professor Matthew Hodgart

English 625 (668,669)
Studies in 19th-Century Literature
Special Subject 1970-71
Studies in Romanticism
Associate Professor L. E. MacLean

English 626 (670,671)
Studies in 20th-Century Literature
Special Subject 1970-71
Conrad*
Associate Professor S. de V. Hoffman

English 631 (672,673)
Studies in Poetry
Special Subject 1970-71
Victorian Poetry*
Assistant Professor L. Poteet

English 632 (674,675)
Studies in Drama
Special Subject 1970-71
Mimesis and Modern Theatre*
Associate Professor R. Belkin

English 633 (676,677)
Studies in Fiction
Special Subject 1970-71
The Gothic Novel*
Assistant Professor L. Poteet

English 635 (678,679)
Studies in the History of Ideas
A. Special Subject 1970-71
American Literature and the Apocalyptic Imagination
Assistant Professor David Ketterer
B. Special Subject 1970-71
The Aesthetic and Religious Experience in Literature
Associate Professor A. Bruné

GRADUATE PROGRAMME COURSES OFFERED: (cont'd)

English 641 (680,681)	Studies in Shakespeare Special Subject 1970-71 The History Plays Assistant Professor L. Mendelsohn
English 642 (682,683)	Studies in American Literature Special Subject 1970-71 Faulkner Assistant Professor C. Blaise
English 643 (684,685)	Studies in Canadian Literature A. Special Subject 1970-71 Raymond Souster and little magazines from the Forties to the Sixties* B. Special Subject 1970-71 Raymond Knister as Novelist and Writer of Short Stories* Associate Professor M. Gnarowski
English 650 (686,687)	Literary Criticism Associate Professor R. J. Sommer Offered 1970-71
English 651 ** **(688,689)**	Seminar: Section A Special Subject 1970-71 The American-Jewish Novel Associate Professor M. Butovsky Section B Special Subject 1970-71 Bloomsbury and Anti-Bloomsbury Associate Professor M. Foster
English 653 (691,692)	Anglo-Saxon Professor R. C. Wasserman Offered 1970-71
English 690	Thesis.

N.B. Course listings for 1970-71 are tentative, and may change without notice. Those marked with an asterisk are half-courses.

Applications for Assistantships must be received by March 13, 1971; all other applications should be received by June 12, 1971.

* When a half-course rather than a full course is offered, the number applied to it for purposes of registration and transcript accreditation is the first of those indicated in brackets. A student who is permitted to take a second half-course under the same course heading as that in which he has previously been registered, will register under the second of these bracketed numbers and be accredited accordingly. Except in extraordinary cases, a student will be permitted to take no more than a total of two half-courses, or one full course and one half-course, offered under the same course heading. Half-courses offered in 1970-71 are asterisked in the list set out above.

** A student who is permitted to register for a second special seminar in English 651, provided the Seminar carries full course credit each time, will do so under the number English 652.

DEPARTMENT OF FINE ARTS

Professor of Fine Arts, and Chairman of the Department

Edwy Cooke, M.F.A. (Iowa)

Professors

Douglass Burns Clarke, M.A. (McGill)
Alfred Pinsky (on leave 1970-71)
Leah Sherman, M.A. (N.Y.U.)

Associate Professors

Leon Frankston, Ed.D. (Columbia)
J. Russell Harper, M.A. (Toronto)
Frank Mulvey, B.S. (Tufts)

Assistant Professors

Donald F. Andrus, M.A. (Toronto)
Edward G. Bakony, M.A. (U.B.C.)
Philip Cohen, B.A. (S.G.W.)
Christopher Gabriel-Lacki, B.A. (La Courtine)
Yves J. Gaucher
Aristides Gazetas
Jean P. Goguen, B.A. (Stanislas)
Stanley E. Horner, M.F.A. (Syracuse)
Ellen James, M.A. (Columbia)
Judith Kelley, M.F.A. (Wisconsin)
Peter London, M.F.A. (Columbia)
F. John Miller
John Ivor Smith, B.Sc. (McGill)
Norma Springford, B.A. (U.N.B.)
Barry Wainwright

Lecturers

Kenneth Adams, B.Sc. (S.G.W.)
Gary Coward, M.F.A. (Michigan)
Dennis Jones

Special Lecturer

Orson Wheeler, B.A. (Bishop's)

The Department of Fine Arts offers a programme of study leading to the degree of Master of Arts in the field of Art Education. The programme is based on the belief that teachers of art, at every level, must have an intimate understanding of the nature of art, and should have achieved proficiency in studio work. Seminars stress the integration of relevant material from other disciplines with studio experience, the philosophy and practice of art education, art history, and aesthetics. The programme is offered in the late afternoon and evening, making it available to both day and evening students concurrently.

Admission Requirements

A Bachelor of Fine Arts degree, or a B.A. with specialization in art, or the equivalent, desirably with a "B" average in Fine Arts subjects. Undergraduate courses must have included :

2 full courses in Art Education

2 full courses in the History and Philosophy of Education

1 full course in Psychology

In addition, the candidate must have had some experience in the teaching of art prior to admission to the programme. Applicants with deficiencies in their undergraduate preparation may be required to take up to three undergraduate courses in addition to their regular graduate programme.

Requirements for the Degree

1. The minimum period of residence for a full-time student is one calendar year.

2. A fully qualified candidate must complete the following courses : Art 612, Art 613, Art 651, Art 652, Art 690 or Art 691.

3. Each student must submit a thesis on a topic directly related to the pedagogical aspects of art. The possibilities for topics of investigation in Art Education are broad, and the results of the research may be presented in visual as well as written form. The thesis must be developed in close consultation with the advisor and be approved by him and the Director of the Graduate Programme. A student will register for Art 690 or Art 691 in the year in which he expects to undertake his work on the thesis.

4. Each student is required to exhibit some of his work upon completion of the studio courses, at a time to be decided upon by the student and his advisor.

COURSES

631 - Art 612. Selected Studies in Studio Arts
This course assumes the mature and competent handling of studio media. Students select their own projects and develop them on a tutorial and seminar basis after approval by a faculty member.

631 - Art 613. Selected Studies in Studio Arts
Art 612 is a prerequisite for this course but may be taken concurrently with it.

631 - Art 651. Seminar: Topics in Contemporary Problems of Art Education, Education & Psychology.

631 - Art 652. Seminar: Topics in Contemporary Problems of Art Education, Education & Psychology.

631 - Art 690A. Research in Studio Arts.

631 - Art 690B. Research in Theoretical Topics.

DEPARTMENT OF HISTORY

Professors

Martin Deming Lewis, Ph.D. (Chicago)
Edward Eastman McCullough, M.A. (McGill)
Cameron Nish, Doctorat (Laval)
Lionel Rothkrug, Ph.D. (University of California at Berkeley)
George Rudé, Ph.D. (London)

Associate Professors

Alan H. Adamson, Ph.D. (London)
Frank Chalk, Ph.D. (Wisconsin)
Terence Copp, M.A. (McGill)
Stephen Scheinberg, Ph.D. (Wisconsin)
Irving Smith, Ph.D. (McGill)

Assistant Professors

C. L. Bertrand, Ph.D. (Wisconsin)
Robin Burns, M.A. (Carlton)
John L. Hill, Ph.D. (Duke)
Frederick H. Krantz, Ph.D. (Cornell)
John F. Laffey, Ph.D. (Cornell)

Lecturer

Richard J. Diubaldo, M.A. (McMaster)

Sessional Lecturer

Gael Alderson-Smith, M.A.T. (Columbia)

The Department of History offers programmes of study leading to the degrees of Master of Arts and Doctor of Philosophy. All courses are offered in the evening hours so as to allow the participation of part-time as well as full-time students.

THE MASTER OF ARTS DEGREE IN HISTORY

Admission Requirements

An Honours degree in History, or its equivalent. Applicants with deficiencies in their undergraduate preparation may be required to take up to three undergraduate courses in addition to their regular graduate programme.

Requirements for the Degree

1. The minimum period of residence for a full-time student is one calendar year, defined as registration during one academic year together with independent study and research during a summer,

either on a thesis, or on the readings assigned under History 688 and History 689 as part of the thesis-equivalent. A half-time student may register for only one seminar in each semester, and for one of History 688 or History 689 during a given year.

2. **Seminars** (all seminars are half-courses, of semester length):

A. All students are required to take one of the following seminars:

704 - History 671. Philosophy of History*
704 - History 673. Methodology of Historical Studies
(This course is recommended for students who are engaged in, or are preparing for, a teaching career in secondary schools or the colleges of general and vocational education in the Province of Quebec.)

B. All students are required to take two seminars in their major field, and one seminar in a minor field, from among the following:

704 - History 613. Problems in Modern European History I**
704 - History 614. Problems in Modern European History II**
704 - History 621. Problems in Canadian History I***
704 - History 622. Problems in Canadian History II***
704 - History 651. Problems in United States History I
704 - History 652. Problems in United States History II
704 - History 661. Problems in Modern Asian History I
704 - History 691. Problems in a Selected Area of History I

3. Students are required either to submit a thesis or to complete the thesis-equivalent:

A. A student who plans to write a thesis will register for **704 - History 690.** Thesis in the year in which he expects to undertake his work on the thesis. The topic for the thesis is to be chosen in consultation with the student's advisor, and must be approved by the research committee of the department, taking into consideration the inherent validity of the proposed topic, the availability of competent supervision, and the available courses. Each thesis shall be read

* Students who have satisfactorily completed an acceptable course in the philosophy of history at the undergraduate level may be excused from this requirement, and substitute a selected seminar from Section B.

** Students in this course are required to have a reading knowledge of French, German, Italian, or any other language judged suitable by the staff member giving this course, in addition to English.

*** Students in this course are required to have a reading knowledge of both French and English.

and graded by the student's thesis director and by two other scholars, one of whom may be an outside examiner.

B. **Thesis-equivalent.** In lieu of a thesis, a student may complete one additional seminar outside his major field, together with the following:

704 - History 688. Readings
704 - History 689. Readings
} The study of two further problems within the student's major field, to be assessed on the basis of papers or examinations.

4. Each student must demonstrate his ability to read and translate historical material in an acceptable modern language other than English.

Language examinations, given several times a year, will be administered by the department.

5. Prior to graduation, each student must pass a comprehensive oral examination before a committee of the department. The examination will test the student's knowledge of his major and minor fields, and (where applicable) his ability to defend his thesis.

6. Normally, all students will be expected to follow the programme of studies prescribed above. In special cases, however, the graduate studies committee of the department may authorize adjustments of an individual student's programme in order to fit his particular needs.

NORMAL PROGRAMME FOR A FULL-TIME STUDENT:

Fall Term	Winter Term	Work to be completed during summer
two of 613	one of 671 or 673	
621	one of 614, 622, 652, 662, 692	690 (thesis)
651	..... OR	.....
661	one of 671 or 673	688 (Readings)
691	two of 614, 622, 652, 662, 692	689 (Readings)

THE DOCTOR OF PHILOSOPHY DEGREE IN HISTORY

Admission Requirements

The normal requirement for admission is a Master of Arts degree in History with high standing from a recognized university. Students enrolled in the M.A. programme in History at Sir George Williams University who have completed all requirements except for the thesis with a grade of "Honours" may apply for permission to proceed directly to doctoral studies without submitting a master's thesis.

Requirements for the Degree

1. The minimum period of residence is two calendar years of full-time graduate study beyond the master's degree, or three calendar years of full-time graduate study beyond the bachelor's degree for those students who are permitted to enroll for doctoral studies without completing a master's degree, or the equivalent in half-time study. Full-time students may register for a maximum of three full courses in a given year. Half-time students are normally limited to one full course in a given year.

2. Graduate students in history at the doctoral level are expected to pursue a programme of independent study and research under the direction and supervision of specialists, in the course of which they will prepare themselves for a general examination over three of the following fields, one of which shall be chosen as the student's "major field."

1. Canadian history
2. Modern European history
3. United States history
4. Colonialism and Nationalism in Asia and Africa
5. A field in a related discipline, chosen with the approval of the Graduate Studies Committee of the Department of History.

Additional fields may be defined at a later date by the Graduate Studies Committee of the Department of History, taking account of the qualifications of staff and the special interests of students.

3. A student enrolled in doctoral studies is required to register for a minimum of four full courses of "directed studies" (or the equivalent in half-courses), no more than two full courses of which may be taken with a professor in his major field. These courses are designated as **History 800.** Directed Studies at an Advanced Level, or by successive numbers in the 800-sequence (e.g., 801, 802, 803, etc.) to indicate the various sections offered by different professors during a particular year. Each student's programme of "directed studies" will be determined by the Graduate Studies Committee of the Department of History, in accordance with the needs of the student and the resources available to the department. In addition, students who have not had a course in the philosophy of history at the undergraduate or graduate level will be required to register for :

704 - History 671. Philosophy of History

When it would contribute to their programme, doctoral students may be required as well to register for one or more of the following seminars :

704 - History 613, 614. Problems in Modern European History I, II
704 - History 621, 622. Problems in Canadian History I, II
704 - History 651, 652. Problems in United States History I, II
704 - History 661, 662. Problems in Modern Asian History I, II
704 - History 691, 692. Problems in a Selected Area of History I, II

4. All doctoral students will be expected to participate in a departmental colloquium which will meet periodically throughout the year.

5. Each student will be expected to undertake a minimum of two weeks of undergraduate teaching during his second year of residence.

6. Before a student will be admitted to candidacy for the Ph.D. degree, he must pass a general examination (both oral and written) over his major field and his two minor fields. This examination is normally taken after completion of the second year of full-time study beyond the master's level. A student who fails to pass his general examination on his first attempt may be permitted to attempt it one further time only, after at least three months have elapsed.

7. A student who has passed his general examination will be admitted to candidacy for the Ph.D. upon acceptance by the Graduate Studies Committee of the department of his proposed dissertation topic and research plan. He will then register for **History 890.** Dissertation Research. A doctoral dissertation in history is expected to be based on extensive research in primary courses, to make an original contribution to historical knowledge, and to be presented in acceptable literary form. When the dissertation is submitted, it will be read and graded by an external examiner from outside the University and an internal committee consisting of the student's major professor and two other members of the department. Where appropriate, one member of the committee may be a faculty member of another department.

8. Doctoral candidates are required to demonstrate their competence to read and translate historical material in one modern language in addition to English.

Language examinations, given several times a year, will be administered by the department.

9. When the student's dissertation has been accepted by an outside examiner and an internal committee, he will be required to make a public oral defense of his dissertation, and to demonstrate his broad knowledge of the field in which the dissertation falls. The examining committee must comprise at least three members of the department and two members of the faculty from outside the department.

DEPARTMENT OF PSYCHOLOGY

Associate Professor of Psychology, and Chairman of the Department
Jane Stewart, Ph.D. (London)

Professor
G.M. Mahoney, Ph.D. (McGill)

Associate Professors
A. Harold Goldsman, Ph.D. (N.Y.U.)
Tannis Y. Maag, Ph.D. (Toronto)
Joseph P. Zweig, Ph.D. (Columbia)

Assistant Professors
David Andres, Ph.D. (Waterloo)
Gabriel R. Breton, M.A. (Montreal)
June S. Chaikelson, M.Sc. (McGill)
William L. Gardiner, Ph.D. (Cornell)
Dolores Gold, Ph.D. (Saskatchewan)
Thomas Gray, Ph.D. (Simon Fraser)
Anthony Hilton, Ph.D. (McMaster)
William R. Hooper, Ph.D. (Toronto)
George R. Marshall, Ph.D. (N.Y.U.)
S.R. Munoz, Ph.D. (Waterloo)
Erat S. Nayar, Ph.D. (Mysore)
Campbell W. Perry, Ph.D. (Sydney)
Beverly J. Sanders, Ph.D. (McGill)
Nancy D. Taylor, Ph.D. (McGill)
Roy A. Wise, Ph.D. (McGill)
Edgar B. Zurif, Ph.D. (Waterloo)

Lecturers
William Brender, M.Sc. (Appl.) (McGill)
George Nemeth, M.Sc. (Appl.) (McGill)

Visiting Lecturer
Karen S. Woodsmall, M.A. (California, Riverside)

The Department of Psychology offers two programmes leading to the degree of Master of Arts in Psychology, one in General-Experimental Psychology, in which the emphasis is on research, and the other in Applied Psychology, in which the emphasis is on both research and applied techniques.

Admission Requirements

An Honours degree in Psychology, or its equivalent, is necessary for admission to the graduate programme. Applicants with deficiencies in their undergraduate preparation may be required to take a special year to complete their undergraduate preparation. Entrance examinations may be required. Completed applications must be received by March 1st, 1971.

PROGRAMME IN GENERAL-EXPERIMENTAL PSYCHOLOGY

Requirements for the Degree

1. The minimum period of residence for a full-time student is one calendar year.

2. Each student must demonstrate his ability to translate into English psychological material from an acceptable modern language in which there is a significant body of psychological literature.

3. A fully qualified candidate is required to complete three courses and thesis, as follows :

a) Required of all students :

Psychology 601. Statistical Analysis and Experimental Design
Psychology 602. Issues in Learning, Motivation, Perception and Cognition
Psychology 603. Issues in Personality and Social Psychology
Psychology 690. Research and Thesis

In addition, students may, in consultation with their supervisor, elect to do :

Psychology 605. Selected topics in psychology

4. All students are expected to participate in a weekly departmental colloquium at which they will have the opportunity to discuss their plans for their theses as well as contemporary problems in psychology.

5. Each student must submit a thesis on a topic chosen in consultation with his advisor. Topics must be approved by a committee of the department. Each thesis shall be read and graded by the student's thesis director and by two other scholars, one of whom may be an outside examiner. A student will register for **Psychology 690,** Research and Thesis in the year in which he expects to undertake his work on the thesis.

6. Each student must take an oral examination before a committee of the department, designed to test his ability to defend his thesis, and his special knowledge of the field in which his thesis falls. A written or oral comprehensive examination may also be required.

PROGRAMME IN APPLIED PSYCHOLOGY

Requirements for the Degree

1. The minimum period of residence for a full-time student is two academic years together with the intervening summer session.

2. Each student must demonstrate his ability to translate into English psychological material from an acceptable modern language in which there is a significant body of psychological literature.

3. A fully qualified candidate is required to take three full courses and a tutorial in Year I of the programme, and two full courses and thesis in Year II of the programme, as follows :

A. Required of all students in Year I :

Psychology 610. Seminar in the Experimental and Theoretical study of Personality
Psychology 611. Seminar in Psychological Measurement
Psychology 605. Tutorial related to the student's area of concentration or special interest

In addition one of the following courses must be selected in consultation with the thesis advisor :

Psychology 613. Tutorial or seminar in Developmental Psychology
Psychology 614. Tutorial or seminar in Social Psychology

B. Required of all students in Year II :

Psychology 601. Advanced Statistical Analysis and Experimental Design
Psychology 612. Seminar in Psychodiagnostics
Psychology 690. Research and Thesis

4. All students are expected to participate in a weekly departmental colloquium at which they will have an opportunity to discuss their plans for their theses as well as contemporary problems in psychology.

5. Each student is expected to complete a four month summer internship under qualified supervision. Hospitals, clinics, schools and community centres in the Montreal area require graduate students as workers and assistants. Remuneration may or may not be involved, depending upon the nature and extent of the work and the arrangements which may be made between the graduate student, his field supervisor, and his thesis advisor. During Year II of the programme, students will be involved in part-time internships.

6. Each student must submit a thesis on a topic chosen in consultation with his advisor. Topics must be approved by a committee of the department. Each thesis shall be read and graded

by the student's thesis director and by two other scholars, one of whom may be an outside examiner. A student will register for **Psychology 690.** Research and Thesis in the year in which he expects to undertake his work on the thesis.

7. Each student must take an oral examination before a committee of the department, designed to test his ability to defend his thesis, and his special knowledge of the field in which his thesis falls. A written or oral comprehensive examination may also be required.

DEPARTMENT OF RELIGION

Professor

Charles Davis, S. T. L. (Pontifical Gregorian University)

Associate Professors

Burton Leiser, Ph.D. (Brown)
Sheila McDonough, Ph.D. (McGill)
Peter Slater, Ph.D. (Harvard)

Assistant Professors

Michel Despland, Th.D. (Harvard)
Jean Ouellette, Ph.D. (Hebrew Union)
John Rossner, S. T. M. (McGill)

Special Professors (on part-time appointments)

R. L. Slater, Ph.D. (Columbia)
A. Zijdervelt, Ph.D. (Leiden)

Lecturer

Jonathan Siegel, M.A. (Brandeis)

The Department of Religion offers two programmes. One leads to the degree of Master of Arts in History and Philosophy of Religion, and the other leads to the degree of Master of Arts in Judaic Studies. All courses are offered in the evening, to permit the attendance of both full-time and part-time students.

The programmes are predicated upon the beliefs that students of any particular religious tradition must have a thorough grounding in the methodology of the study of religion, or in comparative religion, and that students of religion must acquire a degree of familiarity with a religious tradition other than that of their own culture.

Admission Requirements

An honours degree in religious studies, or its equivalent. Applicants with deficiencies in their undergraduate preparation may be required to take up to three undergraduate courses in addition to their regular graduate programme.

PROGRAMME IN HISTORY AND PHILOSOPHY OF RELIGION

Requirements for the Degree

1. The minimum period of residence for a full time student is one calendar year.

2. Each student will work under the supervision of an advisor who with one other member of the department, will constitute the student's advisory committee.

3. A fully qualified candidate must select the equivalent of four full courses in consultation with the advisory committee.

4. Each student must submit a thesis on a topic chosen in consultation with the advisory committee. Each thesis shall be read and graded by the student's thesis director and by two other scholars, one of whom may be an outside examiner.

COURSES

The following courses will be offered in 1970-71. All of the courses listed are half-courses.

610 - Religion 600. Master's Research and Thesis

610 - Religion 610. Methodological Problems in the Study of Religion

Topics in Philosophy of Religion

610 - Religion 621. Readings in Kant

610 - Religion 623. Readings in Contemporary Philosophy of Religion

610 - Religion 626. Religious Language

610 - Religion 627. Mysticism

Topics in Judaic Studies

610 - Religion 668. Ancient Near Eastern Studies

610 - Religion 692. Medieval Judaism II

610 - Religion 696. Modern Judaism II

The following courses will not be offered in 1970-71 but may be included in future years.

Topics in Islam, Hinduism and Buddhism

610 - Religion 612. History of Islamic Thought and Institutions

610 - Religion 613. Modern Islamic Thought

610 - Religion 614. History of Hindu Thought and Institutions

610 - Religion 616. History of Buddhist Thought and Institutions

610 - Religion 617. Modern Buddhist Thought

Topics in Philosophy of Religion

610 - Religion 624. Readings in Kierkegaard

610 - Religion 625. Selected Periods in the History of Christian Thought

Topics in Religious Ethics

610 - Religion 632. Theoretical Problems in Religion and Culture

Applications must be received by April 31, 1971.

PROGRAMME IN JUDAIC STUDIES

1. The minimum period of residence for a full time student is two calendar years.

2. Each student will work under the supervision of an advisor who, with one other member of the department, will constitute the student's advisory committee.

3. A fully qualified candidate must select the equivalent of eight full courses (in consultation with his advisory committee) or six full courses and a thesis. Each thesis shall be read and graded by the student's thesis director and by two other scholars, one of whom may be an outside examiner. Study in a religious tradition other than that of his own culture will be required if such studies were not included in the undergraduate programme.

4. Candidates on entrance must take a qualifying examination in Hebrew. If in the opinion of the examiner, the candidate is deemed to have insufficient knowledge of the language, he will be required to take **Religion 453.**

5. The area of the candidates research interest may indicate the requirement for knowledge of an additional language in which case his advisory committee may require proficiency in that language.

COURSES

The following courses will be offered in 1970-71. All of the courses listed are half-courses.

610 - Religion 600. Master's Research and Thesis

610 - Religion 610. Methodological Problems in the Study of Religion

Topics in the Hebrew Bible

610 - Religion 662. Hebrew Bible I
Narrative and legal portions from the Hebrew Bible, selectives from Pentateuch and Former Prophets.

610 - Religion 663. Hebrew Bible II
Introduction to Prophetic Literature. Reading and interpretation of a prophetic book or of selections from the prophetic literature.

610 - Religion 668. Ancient Near Eastern Studies
Seminar. A study of various religious institutions characteristic of the Ancient Near Eastern cultures, with special reference to the historical developments of ancient Judaism. The contents of the course may vary from year to year in order to meet the specific needs of students who wish to study ancient literatures other than biblical.

Topics in Talmud

610 - Religion 672. Tannaitic Hebrew
Introduction to Mishnaic Hebrew. Selected readings from the Mishnah, with Bertinoro's commentary and from the Tosefth.

610 - Religion 673. Midrash
The Enegetic Midrash. Readings from the Tannaitic Midrash.

610 - Religion 675. Talmud I
Selected passages from the Babylonian Talmud illustrative of the thinking process at work in the Gemara. The selections may vary from year to year.

Topics in Medieval and Modern Judaism

610 - Religion 692. Medieval Judaism II
The emergence of medieval Jewish philosophy. Selected readings from one or several of the most representative philosophers.

610 - Religion 696. Modern Judaism II
Seminar. Modern Jewish thought. An exploration of the theology of one or several Jewish religious thinkers in the 20th century.

The following courses will not be offered in 1970-71 but may be included in future years.

Topics in Hebrew Bible

610 - Religion 664. Hebrew Bible III
The Wisdom Literature. Reading and interpretation of selected portions from the Ketubim.

610 - Religion 665. Hebrew Bible IV
Seminar. The study of a Biblical concept or of a Biblical institution. This course is designed primarily to familiarize the student with the methods of biblical criticism.

610 - Religion 666. Palestinian Archaeology
Seminar. The Archaeology of Syria/Palestine in the Bronze and Iron Ages. A study of the history and material culture of Syria/Palestine from ca. 3600 B.C. to 587 B.C. based on the archaeological evidence.

610 - Religion 667. Bible and Commentaries
Readings of selected portions of the Hebrew Bible, Rashi, and other medieval commentators. This course is designed primarily to introduce the student to the history of Jewish Bible exegesis.

Topics in Talmud

610 - Religion 674. Aramaic
Talmudic aramaic, as reflected in the non-halakhic passages of the Talmud.

610 - Religion 676. Talmud II
A study of halakah. Significant development of Jewish law and custom are analysed, with special reference to sectarian writings, such as the Qumran texts, or the Karaite movement, etc.

Topics in Hellenistic Judaism

610 - Religion 681. Septuagint.
An introduction to Septuagintal studies. The course may include the detailed study of a Septuagintual book.

610 - Religion 682. Hellenistic literature
Seminar in Philosophy. A study of the problems involved in the Hellenization of Judaism.

610 - Religion 683. New Testament
Seminar. The New Testament with its special relationship to the Judaism of the time.

Topics in Medieval and Modern Judaism

610 - Religion 691. Medieval Judaism I
The Jews in the Middle Ages.

610 - Religion 693. Medieval Judaism III
Seminar. Religious Hebrew literature in medieval times.

610 - Religion 694. Jewish Mysticism
Seminar. The History of Jewish mysticism and Hasidism through the ages.

610 - Religion 695. Modern Judaism I
The Jews in the modern world.

610 - Religion 697. Modern Judaism III
Liturgy. Prayer in Jewish theology. The growth of the Siddur. Theological issues involved in Jewish worship today.

610 - Religion 698. Reading course.
By special arrangements.

Applications must be received by April 31, 1971.

DEPARTMENT OF PHILOSOPHY

Professor of Philosophy, and Chairman of the Department
Stanley G. French, Ph.D. (Virginia)

Professor
Dallas Laskey, Ph.D. (Harvard)

Associate Professors
Roger B. Angel, Ph.D. (McGill)
Robert E. Carter, Ph.D. (Toronto)

Assistant Professors
M. Mobin Ahmad, Ph.D. (Chicago)
Christine Garside, Ph.D. (Claremont)
Vladimir Zeman, Ph.D. (Prague)

The Department of Philosophy at Sir George Williams University offers the M.A. degree, starting in the academic year 1971-72. The first graduate course offerings will be in the summer of 1971. Students for whom it is necessary to do a make-up or *qualifying year may commence this programme in 1970.*

Admission Requirements

A candidate who holds an honours degree in Philosophy or its equivalent, will be admitted to the one-year M.A. programme, starting in the summer of 1971.

Students with deficiencies in their undergraduate preparation, i.e., who do not possess an honours degree in Philosophy, shall be required to take up to five undergraduate courses as Special Year students.

Summary of the Programme

COURSES

The Department of Philosophy offers (starting in the summer of 1971) a minimum of eight one-term, seminar courses each year. Topics shall be chosen from among the areas of Philosophy listed below. Where it is deemed necessary to devote a full course to a given topic, the course shall be referred to by a double number (e.g. 600/601). A list of specific topics to be offered shall be circulated to all students in the spring of each year.

600 - 609. Topics in History of Philosophy
610 - 619. Topics in Logic and Philosophy of Logic
620 - 629. Topics in Ethics and Value Theory
630 - 639. Topics in Epistemology

640 - 649. Topics in Metaphysics

650 - 659. Topics in Philosophy of Science and Philosophy of the Social Sciences

660 - 669. Topics in Contemporary Philosophy

670 - 679. Selected Topics in Philosophy

690 M.A. Comprehensive Examinations

695 M.A. Thesis

Remark : Courses for Special Year students are listed in the undergraduate calendar.

Comprehensive Examinations and Thesis

Two comprehensive examinations (Philosophy 690) must be taken, one in the History of Philosophy, and one in either Logic or Systematic Philosophy.

Each student must submit a thesis, prepared under the guidance of a member of the Department.

The comprehensive examinations shall be conducted by the graduate committee of the Department, which will also approve the topic of the thesis.

Applications and Deadlines

Applications for admission as a Special Year student may be obtained by writing to the Secretary, Department of Philosophy, Sir George Williams University, Montreal 107, Canada. The deadline for the completed application is May 15, 1970, for those intending to take courses in the summer of 1970, and August 15, 1970, for those intending to start in September, 1970.

Applications for admission to the M.A. program may be submitted starting in September, 1970.

Candidates wishing to apply for Conference Leader positions must do so by March 31, 1971.

DEPARTMENT OF BIOLOGICAL SCIENCES

Associate Professor of Biology, and Chairman of the Department

Gerard Leduc, Ph.D. (Oregon)

Professor

Donald L. Peets, B.Sc. (McGill)

Associate Professors

H.E. Enesco, Ph.D. (Columbia)
R.K. Ibrahim, Ph.D. (McGill)
C.F. MacLeod, Ph.D. (Minnesota)
P.K. Menon, M.A. (Madras)

Assistant Professors

F.S. Abbott, Ph.D. (Alberta)
Perry D. Anderson, M.Sc. (Western)
S.S. Ashtakala, Ph.D. (Toronto)
Austina V. Kennedy, M.Sc. (Western)
Ruth L. Lowther, Ph.D. (Toronto)
Elaine B. Newman, Ph.D. (Radcliffe)
Daniel F. Waltz, M.Sc. (Ottawa)

The Department of Biological Sciences offers a programme of study leading to the degree of Master of Science.

Admission Requirements

An Honours degree in Biology, or its equivalent. Applicants with deficiencies in their undergraduate preparation may be required to take up to three undergraduate courses in addition to their regular graduate programme.

Requirements for the Degree

1. The minimum period of residence for a full-time student is one academic year.

2. Each student must demonstrate his reading ability in a language other than English which is acceptable to the student's advisory committee.

3. A fully qualified candidate is required to take the following courses :

a. one 600-level "advanced topics" course in his field of specialization;

b. another 600-level "advanced topics" course or a senior undergraduate course outside his field of specialization, as approved by his advisory committee;

c. **Biology 690.** Research and Thesis.

4. The thesis will be examined by the student's advisory committee and an outside examiner before being accepted by the department. In addition, an oral examination will be conducted before a committee of the department to test the student's ability to defend his thesis.

5. Each student is required to attend and participate in departmental seminars.

6. Research areas

— Fresh water biology including physiology, toxicology, development and ecology of fishes; physiology and ecology of algae.

— Cytogenetics including cytology of the nucleolus; cytophotometric studies of nucleoproteins; microbial genetics.

— Microbiology including bacterial metabolism; physiology of fungal plant pathogens.

— Plant physiology and biochemistry including studies on flower pigments; control of phenolic synthesis in relation to morphogenesis, chemotoxonomy.

— Terrestrial vertebrate ecology, population studies.

— Comparative histology of vertebrates with emphasis on reproductive systems.

COURSES

Biology 610. Advanced studies in Ecology
Biology 620. Advanced studies in Physiology and Biochemistry
Biology 630. Advanced studies in Cytology and Histology
Biology 640. Advanced studies in Genetics
Biology 650. Advanced studies in Microbiology
Biology 660. Advanced studies in Developmental Biology
Biology 690. Research and Thesis

Priority will be given to those applications received by March 31, 1971.

DEPARTMENT OF CHEMISTRY

Professor of Chemistry, and Chairman of the Department
Roger H.C. Verschingel, Ph.D. (McGill)

Professors
Samuel Madras, Ph.D. (McGill)
John Russell Ufford, Ph.D. (McGill)

Associate Professors
Thomas J. Adley, Ph.D. (London)
George L. Campbell, Ph.D. (Rutgers)
Lawrence D. Colebrook, Ph.D. (Auckland)
James G. Dick, B.Sc. (S.G.W.)
Zacharias Hamlet, Ph.D. (Notre Dame)
Robin T.B. Rye, Ph.D. (London)
Roderick E. Townshend, Ph.D. (Ottawa)
Ronald A. Westbury, Ph.D. (McGill)

Assistant Professors
Peter H. Bird, Ph.D. (Sheffield)
Jacques Lenoir, B.Sc. (S.G.W.)
Andrew D. Long, B.Sc. (S.G.W.)
Nick Serpone, Ph.D. (Cornell)

The Department of Chemistry offers programmes of study leading to the degrees of Master of Science and Doctor of Philosophy. Candidates for the master's degree may register on either a full-time or a half-time basis, and courses will be offered in the late afternoon and evening when necessary to accommodate students who are employed during the day. Candidates for a Ph.D. are normally expected to register on a full-time basis.

THE MASTER OF SCIENCE DEGREE IN CHEMISTRY

Admission Requirements

An Honours degree in Chemistry, or its equivalent. Applicants with deficiencies in their undergraduate preparation may be required to take up to three undergraduate courses in addition to their regular graduate programme.

Applications received by March 31, 1971 will receive priority consideration.

Requirements for the Degree

1. The minimum period of residence for a full-time student is one academic year.

2. Each student must demonstrate his reading ability in a language other than English which is acceptable to the student's advisory committee.

3. A fully qualified candidate is required to take the following courses :

a. one 600-level "advanced topics" course in the general field of his research problem;

b. another 600-level "advanced topics" course, to be chosen by his advisory committee;

c. **Chemistry 650.** Master's Research and Thesis.

4. The thesis will be examined by the student's advisory committee before being accepted by the department. In addition, an oral examination will be conducted before a committee of the department to test the student's ability to defend his thesis.

5. Each student is required to attend and participate in departmental seminars.

THE DOCTOR OF PHILOSOPHY DEGREE IN CHEMISTRY

Admission Requirements

The normal requirement for admission is a Master of Science degree in Chemistry with high standing from a recognized university. Students enrolled in the M.Sc. programme in Chemistry at Sir George Williams University who have completed all requirements except for the thesis with a grade of "Honours" may apply for permission to proceed directly to doctoral studies without submitting a master's thesis.

Applications received by March 31, 1971 will receive priority consideration.

Requirements for the Degree

1. The minimum period of residence is two calendar years of full-time graduate study beyond the master's degree, or three calendar years of full-time graduate study beyond the bachelor's degree for those students who are permitted to enroll for doctoral studies without completing a master's degree. It should be understood that this is a minimum requirement, and that a longer period may be necessary in order to complete all of the work that is required for the degree.

2. Each student must demonstrate his reading ability in two languages other than English which are acceptable to the student's advisory committee. (Students who have passed a language examination at the master's level in one language need not be re-examined in that language.)

3. A fully qualified candidate is required to take the following courses :

a. a second 600-level "advanced topics" course in the general field of his research problem;

b. **Chemistry 855.** Research Proposal.

c. **Chemistry 850.** Doctoral Research and Thesis.

4. When a student has completed his thesis, it must be examined both by the student's advisory committee, and by an external examiner chosen by the department. Before a thesis is accepted, an oral examination will be conducted before a committee of the department to test the student's ability to defend his thesis.

5. Each student is required to attend and participate in departmental seminars.

COURSES

The content of the following courses will vary from year to year and will reflect the interests of the department and the instructor in the course (all courses are full courses) :

503 - Chemistry 610. Advanced Topics in Analytical Chemistry I
503 - Chemistry 611. Advanced Topics in Analytical Chemistry II
503 - Chemistry 615. Advanced Topics in Inorganic Chemistry I
503 - Chemistry 616. Advanced Topics in Inorganic Chemistry II
503 - Chemistry 620. Advanced Topics in Organic Chemistry I
503 - Chemistry 621. Advanced Topics in Organic Chemistry II
503 - Chemistry 630. Advanced Topics in Physical Chemistry I
503 - Chemistry 631. Advanced Topics in Physical Chemistry II
503 - Chemistry 690. Advanced Topics in Instrumentation I
503 - Chemistry 691. Advanced Topics in Instrumentation II
503 - Chemistry 855. Research Proposal

This course is designed to introduce students to the procedure involved in initiating research problems. Students will be expected to prepare a paper outlining an original research proposal and to discuss this before the staff of the department. The proposal must include a literature search, an outline of the theory involved, and a discussion of how the problem might be solved. No experimental work is required.

503 - Chemistry 650. Master's Research and Thesis
503 - Chemistry 850. Doctoral Research and Thesis

Students will work on a research project under the direction of a staff member and present an acceptable thesis at the conclusion.

Research in Chemistry

Areas in which research is currently being carried out in the Department of Chemistry, or in which research projects are planned, are as follows :

1. Biochemistry

Physical biochemistry; thermodynamics and kinetics of enzyme reactions aimed at elucidation of mechanisms and the nature of sites of action. Investigation of specific enzymatic capabilities of typical cells and cell types in the central nercous system. Studies of the mode of action of exogenous compounds on functional neurochemistry. Studies in comparative biochemistry.

2. Inorganic Chemistry

Problems in co-ordination chemistry. Preparative inorganic chemistry, particularly of transition metal complexes. Electronic structure and stereochemistry of transition metal complexes. Ligand exchange studies by n.m.r. Electrochemistry and electrochemical kinetics, with particular application to polarographic systems. Unusual oxidation states of elements. X-ray structural elucidation of inorganic molecules. X-ray fluorescence spectrometry. Hydrogen bonding studies of some β-diketone complexes.

3. Organic Chemistry

Studies in organic synthesis, stereochemistry, and reaction mechanisms. Synthesis of model compounds related to steroidal alkaloids. Chemistry of acetylenic compounds. Chemistry of ylids. Photochemistry. Mass spectrometry of halogen- and nitrogen-containing compounds. Applications of n.m.r. (including ^{13}C and ^{19}F spectroscopy to organic structural and stereochemical problems. Kinetics of processes involving restricted conformational change. N.m.r. spectra of diastereomeric rotational isomers.

4. Physical Chemistry

Chemical kinetics in the gas phase. Thermochemistry. Kinetics of polymerization reactions. Physical properties of selenium and tellurium. Reduction reactions involving copper. Mass spectrometry: effect of structure on fragmentation patterns. Applications of e.p.r. spectroscopy to structure determination. Molecular rotational resonance spectroscopy, nifrared and Raman vibrational spectroscopy of symmetric top and slightly asymmetric top melecules of Group V and VI elements.

DEPARTMENT OF MATHEMATICS

Professor of Mathematics, and Chairman of the Department
Victor Byers, Ph.D. (McGill)

Professors
Frederick W. Bedford, M.Sc. (McGill)
Norman Edward Smith, Ph.D. (McGill)

Visiting Professor
Charles Fox, D.Sc. (London)

Associate Professors
Kailash K. Anand, M.A. (Delhi)
Mary A. Brian, M.A. (Bryn Mawr)
Martin Harrow, Ph.D. (McGill)
James C. Hayes, M.Sc. (McGill)
Eugen A. Pollitzer, M.Sc. (Rutgers)
John Senez, M.Sc. (McGill)
Jean C. Turgeon, Ph.D. (Columbia)
Edna Vowles, B.Sc. (Bristol)

Assistant Professors
Leonda S. Adler, M.A. (McGill)
J. Brody, Ph.D. (Charles)
A. M. Chrysovergis, M.Sc. (Montreal)
Gerard E. Cohen, Ph.D. (McGill)
T. Dwivedi, M.Sc. (Gorak., Ottawa)
Abraham S. Fox, M.Sc. (McGill)
N. Herscovics, B.Sc. (McGill)
G. S. Lingappaiah, M.Sc. (Mysore)
M. Malik, Ph.D. (Montreal)
Manfred E. Szabo, M.A. (Oxon.)
J. M. Negrepontis, M.Sc (McGill)
Diana Y. Wei, Ph.D. (McGill)
M. Zaki, M.Sc. (Aligarh)

Lecturer
M. Belinsky, M.Sc. (McGill)

Sessional Lecturers
M. Alberta Boswall, B.Ss. (Dal.)
Alma N. Dobson, B.Sc. (Manchester)

The Department of Mathematics offers a programme of study leading to the degree of Master in the Teaching of Mathematics (M.T.M.) The programme is offered in the late afternoon and evening, making it available to both day and evening students concurrently.

Admission Requirements

A bachelor's degree, a teacher's certificate, and at least one year's experience in the teaching of secondary school mathematics, as well as an adequate mathematical background up to and including :

a. A full course in Statistics-Probability.
b. A full course in Intermediate Analysis.
c. A full course in Algebra involving a study of fundamental algebraic systems.
d. A working knowledge of computer language.

Applicants with an inadequate background will be required to take the necessary undergraduate courses.

Degree Requirements

1. A fully qualified candidate is required to take five 600-level full courses (or half-course equivalents) approved by the Department. A part-time student may not take more than two full courses in a given academic year.

2. Each student is required to submit a paper on an approved mathematical topic related to one of his courses.

COURSES

502 - Mathematics 610. Algebra

Sets and mappings, groups, rings and fields; number systems; polynomials; vector spaces and algebras. (Full course.)

502 - Mathematics 611. Topics in Abstract Algebra. (Full course).

502 - Mathematics 612. Topics in Linear Algebra. (Full course).

502 - Mathematics 613. Topics in Number Theory. (Half course).

502 - Mathematics 614. Linear Algebra

Vector spaces, matrices, linear transformations, determinants, equivalence relations, canonical forms, Euclidean n-space. (Full course).

502 - Mathematics 615. Abstract Algebra

Sets and mappings, groups, rings and fields, number systems, polynomials, Boolean Algebra and field extensions. (Full course).

512 - Mathematics 620. Geometry

Euclid's axioms; Hilbert's axioms for Euclidean Geometry; Euclid's 5th postulate and the work of Saccheri, Lambert, and Legendre; Consistence of non-Euclidean Lobachevskian Geometry; Projective Geometry; Introduction to Topology. (Full Course).

512 - Mathematics 621. Geometry

The work of Saccheri, Lambert and Legendre, non-Euclidean geometry, projective geometry.

502 - Mathematics 625. Topology

Topologies and topological spaces, functions, mappings and homeomorphisms, connected spaces, compact spaces, hierarchy of topological spaces, metric spaces. (Half course.)

502 - Mathematics 630. Analysis

The real number system; Functions of the real variable; limits, continuity, differentiability; Theories of integration; Analytic functions; Cauchy-Riemann conditions, power series representation, conformal mapping; Integral theorems; Analytic continuation. (Full course.)

502 - Mathematics 631. Topics in Analysis (Full course).

502 - Mathematics 632. Topics in Real Analysis (Full course).

502 - Mathematics 633. Topics in Complex Analysis (Full course).

502 - Mathematics 634. Topics in Differential Equations (Half course).

512 - Mathematics 635. Topics in Modern Analysis

Measure space, measurable function, Lebesque integration, theorems on convergence, differentiation, Radon-Nikodym Theorem. Banach space, Hilbert space, linear operators, linear functionals, orthogonality, Reisz representation Theorem, Hahn-Banach Theorem. (Half course.)

502 - Mathematics 636. Topics in Statistics (Full course).

502 - Mathematics 640. Logic and Sets

Basic relations and operations in sets; Boolean algebra; Symbolic logic; Propositional Calculus Theorem; the logical equivalence of Boolean Algebra and Propositional Calculus; Switching circuits; Quantifiers. (Half course.)

502 - Mathematics 645. Numerical Analysis

Roots of an equation; Interpolation; Numerical differentiation and integration; Solution of systems of linear equations; Inversion of matrices; Finite differences; Digital computers, Fortran. (Half course.)

502 - Mathematics 650. Elementary Mathematics from an Advanced Point of View

Prerequisites : four full graduate mathematics courses. Historical development of selected mathematical ideas; interaction between mathematics and the natural and social sciences; Theory of problem solving; Workshop on the presentation of elementary mathematical concepts. (Full course.)

DEPARTMENT OF PHYSICS

Professor of Physics, and Chairman of the Department

Walter R. Raudorf, Ph.D. (Vienna)

Associate Professors

Stanley P. Morris, Ph.D. (McGill)
Jean-Pierre Pétolas, B.Sc. (S.G.W., McGill)
Ramesh C. Sharma, Ph.D. (Toronto)
Adolph E. Smith, Ph.D. (Michigan)

Assistant Professors

David E. Charlton, Ph.D. (Saskatchewan)
Nelson Eddy, Ph.D. (Arizona)
Barry Frank, Ph.D. (U.B.C.)
Arlin L. Kipling, Ph.D. (Exeter)
J. A. MacKinnon, Ph.D. (McGill)
Sushil K. Misra, Ph.D. (St. Louis)

The Department of Physics offers programmes of study leading to the degrees of Master of Science and Doctor of Philosophy. Candidates for degrees may register on either a full-time or a half-time basis, and courses will be offered in the evening hours in order to accommodate both full-time and half-time students.

THE MASTER OF SCIENCE DEGREE IN PHYSICS

Admission Requirements

An Honours degree in Physics, or its equivalent. Applicants with deficiencies in their undergraduate preparation may be required to take up to three undergraduate courses in addition to their regular graduate programme.

Requirements for the Degree

1. The minimum period of residence for a full-time student is one academic year. He may take a maximum of three full courses, in addition to the Research and Thesis course, during this period. A half-time student is restricted to two full courses, one of which may be the Research and Thesis course, during a given academic year.

2. A fully qualified candidate is required to take **Physics 611** and two other 600-level courses chosen with the approval of the chairman of the department and the student's research director, in addition to **Physics 650.** Master's Research and Thesis.

THE DOCTOR OF PHILOSOPHY DEGREE IN PHYSICS

Admission Requirements

The normal requirement for admission is a Master of Science degree in Physics with high standing from a recognized university.

Students enrolled in the M.Sc. programme in Physics at Sir George Williams University who have completed all requirements except for the thesis with a grade of "Honours" may apply for permission to proceed directly to doctoral studies without submitting a master's thesis.

Requirements for the Degree

1. Each student who has been admitted to the programme must take an orientation examination prior to his first registration as a doctoral student. This examination will not be graded, but will serve only to guide the student and his advisor in determining the appropriate pattern of studies to be followed.

2. The minimum period of residence is two calendar years of full-time graduate study beyond the master's degree, or three calendar years of full-time graduate study beyond the bachelor's degree for those students who are permitted to enroll for doctoral studies without completing a master's degree, or the equivalent in half-time study.

3. A student must take a minimum of one 600-level course in a field which was not covered in his studies for the M.Sc., and depending upon the results of his orientation examination, he may be required to take additional courses.

4. Each student will register for **Physics 850.** Doctoral Research and Thesis, in his first year of doctoral studies, but he should expect to continue his work in this course throughout the entire period of his doctoral studies, since the final year of residence will be devoted mainly to the preparation of the thesis.

5. Each student must take a preliminary examination, which may be written or oral or both, before he will be admitted to candidacy for the Ph.D. degree. The examination will be based on the honours physics program at this university. The preliminary examination will normally be taken during the first year of graduate study beyond the master's degree, or the second year of graduate study beyond the bachelor's degree. The result of this examination will determine whether the student will be allowed to continue in doctoral studies. A student who fails to pass his preliminary examination on his first attempt may be permitted only one further attempt, after at least three months have elapsed.

6. A student who has passed his preliminary examination will be admitted to candidacy for the Ph.D. upon acceptance by the Graduate Studies Committee of the deparment of his proposed thesis topic and research plan. A doctoral thesis must make a distinct and original contribution to knowledge, and be presented in acceptable literary form.

COURSES

504 - Physics 611. Advanced Quantum Mechanics

Review of the formal structure of quantum theory from an advanced point of view, matrix methods and transformation theory, angular momentum and spin; systems of particles, perturbation and collision theory, interaction of radiation and matter, introduction to relativistic quantum mechanics, second quantization and elementary quantum electrodynamics. (Full course.)

504 - Physics 621. Theoretical Nuclear Physics

Fundamental facts and theories of the structure of nuclei and their interactions; masses, moments and radii of stable and unstable nuclei, alpha, beta and gamma decay; nuclear models, accelerators and particle physics, nuclear scattering; the many-body problem, Mossbauer effect and resonance fluorescence. (Full course.)

504 - Physics 631. Theoretical Solid State Physics

Advanced treatment of selected topics of current interest in solid state physics. Topics include application of quantum mechanics to solids, band theory of metals and semi-conductors, transport properties, imperfections, magnetic properties, low temperature properties, superconductivity. (Full course.)

504 - Physics 661. Department Seminar, Selected Topics in Current Research

504 - Physics 691. Selected Experiments In Physics

504 - Physics 650. Master's Research and Thesis

504 - Physics 850. Doctoral Research and Thesis

Students will work on a research project under the direction of a staff member of the department, and present an acceptable thesis at the conclusion. The research done will be in areas which reflect the interest of the staff and the facilities of the department.

Applications received by March 31, 1971 will receive priority consideration.

FACULTY OF COMMERCE

Dean of Commerce

Gunther Brink, M.B.A. (Western Ontario)
Professor of Management

Marketing

Professors

Bruce Mallen, Ph.D. (N.Y.U.)
Chairman, Committee of Graduate Studies

Associate Professors

K. C. Dhawan, Ph.D. (N.Y.U.)
G. S. Lane, Ph.D. (Washington)

Assistant Professors

V. H. Kirpalani, M.A. (Oxford)

Management

Professors

J. Kelly, Ph.D. (Strathclyde)
J. Smola, Ph.D. (Montreal)
A. I. Tari, D.Sc. (Paris)

Associate Professors

H. C. Jain, Ph.D. (Illinois)
T. Kubicek, Ph.D. (Montreal)

Assistant Professors

R. W. Hosein, M.B.A. (Western)

Quantitative Methods

Associate Professors

Andrew Berczi, M.B.A. (McGill)
Vice Chairman, Committee of Graduate Studies
G. Pederzoli, Doctorate (Milano)
Z. G. Popp, M.B.A. (Chicago)

Finance

Professors

C. Potter, Ph.D. (McGill)

Associate Professors

G. R. Curnew, M.B.A. (Queen's)

Accountancy

Professors

J. G. Finnie, B.Sc. (S.G.W.U.)

Associate Professors

H. Mann, M.B.A. (McGill)

The Faculty of Commerce offers a programme leading to the degree of Master of Business Administration, open to both full-time and part-time students.

Admission Requirements

1. A bachelor's degree, with high standing, or a qualification accepted as equivalent.

2. Successful completion of the following prerequisite courses, or their equivalents :

a) Mathematics 251. Fundamental Mathematics
b) Quantitative Methods 242. Introductory Statistics
c) Economics 211. Introductory Economics
d) Psychology 211. Introductory Psychology
or
Sociology 211. Introductory Sociology

Applicants with insufficient preparation in the above areas will normally be required to take appropriate undergraduate courses.

3. A satisfactory performance on the Princeton Admission Test for Graduate Studies in Business.

4. Applicants may be required to take oral and/or written qualifying examinations, and may be asked to furnish letters of recommendation.

5. A minimum of two years of experience in business prior to entry into the programme is recommended for those entering on a full-time basis.

Requirements for the Degree

1. The programme is divided into Part I and Part II. Students who have been admitted on the basis of a Bachelor of Commerce degree as defined in the 1965-66 and subsequent Announcements of Sir George Williams University, and who have met all the other admission requirements will, in general, be required to take Part II of the programme only. Other students will in general, be required to take all of Parts I and II.

2. The minimum period of residence for a full-time student is one academic year, that is, the ten half-courses or the equivalent. None of the courses may include courses successfully completed at another institution. Normally, a student without prior academic education in business administration will require two academic years, that is, twenty-two half courses or their equivalent, to complete the programme.

3. For classification as full-time, a student must register for at least eight half-courses in a given academic year. A full-time student

may not register for more than ten half-courses in a given year, nor is he permitted to engage in employment for more than ten hours per week. A full-time student must complete all requirements for the degree within four years from the date of first registration for Part I, and within two years from the date of first registration for Part II.

4. A part-time student must not register for more than two half-courses in a given term. A part-time student must complete all requirements for the degree within eight years from the date of first registration for Part I and within four years from the date of first registration for Part II.

5. A fully qualified candidate who is required to take Part I of the programme will take the following twelve half-courses :

801 - Management 621. Production Management I
801 - Management 622. Production Management II
801 - Management 631. Organizational Behavior I
801 - Management 632. Organizational Behavior II
805 - Finance 621. Financial Management I
805 - Finance 622. Financial Management II
808 - Marketing 621. Marketing Management I
808 - Marketing 622. Marketing Management II
814 - Quantitative Methods 621. Introduction to Operations Research I
814 - Quantitative Methods 622. Introduction to Operations Research II
800 - Accountancy 621. Managerial Accounting I
800 - Accountancy 622. Managerial Accounting II

Pro tanto credit will be given for one or more of the required courses, if in the opinion of the Graduate Studies Committee, the student has successfully completed the equivalent of a given course at a recognized university.

6. In general, a student must have satisfied all requirements up to and including Part I before being admitted to Part II. In addition, he must satisfy the Graduate Studies Committee that he has a basic knowledge of computer programming and applications to business. Part II of the programme consists of four half-courses and one full-course which are compulsory for all students, as well as an additional four elective half-course seminars to be chosen from the list as indicated below.

The compulsory courses are as follows :

801 - Management 651. Management Policy I
801 - Management 652. Management Policy II
850 - Managerial Economics 661. Managerial Economics I
850 - Managerial Economics 662. Managerial Economics II
850 - Business Research 671. Business Research Methodology

The optional seminars for 1970/71 are as follows :

800 - Accountancy 651. Seminar in Taxation
801 - Management 662. Seminar in Organizational Behavior
801 - Management 663. Seminar in Labour Relations
805 - Finance 651. Seminar in Financial Intermediaries
805 - Finance 661. Seminar in Financial Theory
808 - Marketing 651. Seminar in Marketing Research and Information Systems
808 - Marketing 661. Seminar in Distribution Systems
814 - Quantitative Methods 651. Seminar in Statistical Forecasting
814 - Quantitative Methods 661. Seminar in Computer Applications To Business

In addition, arrangements have been made with the Department of Economics so that an M.B.A. student may be admitted to any course or seminar being offered in the M.A. (Economics) program if the student has the necessary background and if space is available. Information on the offerings of the Department of Economics is listed separately in this calender.

7. All students must satisfy the Graduate Studies Committee regarding their ability to read and translate business and economic literature from French into English.

FACULTY OF ENGINEERING

Dean of Engineering

J. Clair Callaghan, M.S. (M.I.T.),

Professors

Jack Bordan, B.Eng., M.Sc. (McGill)
M. P. du Plessis, Ph.D. (Alberta),
Chairman, Department of Mechanical Engineering
F. A. Gerard, Ph.D. (London),
Secretary for Engineering Graduate Studies
Norman F. Jennings, M.S. (Ohio State)
M. N. S. Swamy, Ph.D. (Saskatchewan)
Chairman, Department of Electrical Engineering

Associate Professors

B. B. Bhattacharyya, Ph.D. (Nova Scotia Tech.)
Matthew McC. Douglass, Ph.D. (Oklahoma State),
Acting Chairman, Department of Civil Engineering
George K. Fleming, Ph.D. (Waterloo)
F. Douglas Hamblin, M.Sc. (Durham)
Wojciech M. Jaworski, Ph.D. (Mathematical Institute, Warsaw)
James F. Lindsay, B.Sc. (Glasgow)
B. A. Lombos, Ph.D. (Montreal)
Cedric Marsh, M.A. (Cambridge)
Hugh J. McQueen, Ph.D. (Notre Dame)
V. Ramachandran, Ph.D. (Indian Institute of Science)
S. N. Singh, Ph.D. (Indian Institute of Tech.)
M. S. Troitsky, Dr. Tech. Sc. (Belgrade)

Assistant Professors

Pen. J. Fang, Ph.D. (Cornell)
Paul P. Fazio, Ph.D. (Windsor)
J. Charles Giguere, Ph.D. (Nova Scotia Tech.)
S. A. Gracovetsky, Engineering Physics (Lausanne)
Clyde Kwok, Ph.D. (McGill)
Graham Martin, M.Sc. (New Brunswick)
Gerald S. Mueller, Ph.D. (Manchester)
M. O. M. Osman, Dr. Sc. Tech. (Swiss F.I.T.)
Vaclav Panuska, D.Phil. (Oxford)
A. S. Ramamurthy, Ph.D. (Purdue)
Thiagas Sankar, Ph.D. (Waterloo)
Otto Schwelb, Dip. Eng. (Budapest)
Jankie N. Supersad, Ph.D. (Arizona State)
George D. Xistris, M.Eng. (McGill)

NRC Adjunct Professor

W. Hayes, B.Eng. (McGill)

Lecturer

Wilfried G. Probst, Met.Eng. (Pontif. Catholic University, Rio de Janeiro)

Sessional Lectures

Research Associates

F. D. Galiana, S.M. (M.I.T.)
R. Kahawita, M.A.Sc. (Waterloo)
S. Lin, Dr.Ing. (Karlsruhe)
N. Suresh, M.S. (Nova Scotia Tech.)
R. L. Wang, Ph.D. (McGill)
J. C. Weber, Ph.D. (Calgary)

The Faculty of Engineering offers a programme leading to the degree of Master of Engineering, through evening studies. It also provides an opportunity, in a limited number of research areas, for studies leading to the degree of Doctor of Engineering. Candidates for a D.Eng. are normally expected to register on a full-time basis.

THE MASTER OF ENGINEERING DEGREE

Admission Requirements

Applicants must hold a bachelor's degree in Engineering, or equivalent, with high standing, *and must be currently employed in Engineering*. The Engineering Graduate Studies Committee will determine the acceptability of an applicant for admission to the programme, and may require an applicant to take specified undergraduate courses in order to quality for acceptance.

Requirements for the Degree

1. A fully qualified applicant is required to complete successfully course work and a dissertation requirement for a total of 14 half-credits, and to demonstrate his ability to translate engineering literature from French into English (with the aid of a dictionary) in order to fulfil the requirement for the Degree of Master of Engineering. A half-course is evaluated as a half-credit, and the student can elect to take from eight to twelve half-courses. The dissertation is evaluated as shown on p. 97, and it can vary from a full research thesis to a major technical report. The student will decide on the particular balance between course work and dissertation,

in consultation with faculty, and will plan an individual programme of study. Each individual programme of study must be approved by the Engineering Graduate Studies Committee. When a student has chosen a suitable dissertation topic and has arranged for faculty supervision, his dissertation supervisor will be formally appointed by the Engineering Graduate Studies Committee.

2. The dissertation must represent the results of the student's independent work undertaken after admission to this programme. Work previously published by the student may be used only as introductory or background subject matter. The proposed topic for the dissertation, together with a brief statement outlining the proposed method of treatment, must be approved by the Engineering Graduate Studies Committee. The dissertation will be evaluated by at least two examiners appointed by the Engineering Graduate Studies Committee.

3. Prior to the conferment of the degree, the student must satisfy the Engineering Graduate Studies Committee in respect to his ability to translate engineering literature from French into English. A special examination, in which the use of a dictionary is permitted, may be set.

4. Through the cooperation of the Faculty of Engineering of McGill University, a student may include in his programme some course work from among the current graduate offerings at McGill University, provided that approval for such course work is obtained from the student's advisor prior to registration at McGill University.

5. A student may be granted pro tanto credit for, in general, the equivalent of not more than one full course taken in approved graduate studies prior to entry into this programme. A course submitted for pro tanto credit must be appropriate to the student's programme of study at Sir George Williams University. An application for such credit will be considered only at the time of initial registration. (This paragraph does not apply to graduate courses taken at McGill University under the provisions of paragraph 4 above.)

THE DOCTOR OF ENGINEERING DEGREE

Doctoral programmes are offered in the three research areas of Structures, Fluid Controls, Networks and Systems. In the Structures area, current research projects include Cable-Stayed Bridges, Structural Dynamics, Sandwich Construction Elements, Panelized Building and Folded Plates. In the Fluid Controls area, current research projects include Fluidics (Elements, Systems, Matching and Noise Problems) and Fluid Power (Elements and Systems).

In the Network and Systems area, current research projects include Analysis and Synthesis of Distributed Parameter Networks, Active and Passive Synthesis and Computer-Aided Design.

Admission Requirements

Applicants must hold either

(a) a Master of Engineering degree or equivalent, with high standing from a recognized University, or

(b) a Bachelor of Engineering degree or equivalent, with high standing from a recognized University.

However, applicants should understand that admission is contingent not only upon a superior academic record but also on the availability of relevant courses of study, and adequate laboratory and library facilities for the proposed research.

Requirements for the Degree

1. The minimum period of residence is two calendar years of full-time graduate study beyond the master's degree, or three calendar years of full-time graduate study beyond the bachelor's degree. At least two years must be spent in full-time residence at Sir George Williams University.

2. A student admitted on the basis of a master's degree will, in general, take course work equivalent to at least three full courses. A student admitted on the basis of a bachelor's degree will, in general, take course work equivalent to at least six full courses. Each student's programme must be approved by a supervisory committee consisting of three members of faculty, including the student's research director. This supervisory committee will also arrange for the student's general examination, language examination, and thesis evaluation.

3. Each student must take a general examination, which may be both written and oral, before he will be admitted to candidacy for the D.Eng. degree. The general examination will normally be taken when course work has been largely completed and research work is under way. It will be conducted by the student's supervisory committee, which may add to its membership for this purpose.

4. Prior to conferment of the degree, the student must demonstrate his ability to translate engineering literature into English, or French, from a language in which there is a considerable body of literature in the candidate's research area. A special examination, in which the use of a dictionary is permitted, may be required.

5. Each student is required to plan and carry out a suitable research, development, or design project, which leads to an advance

in knowledge. He must submit a thesis based upon this work and defend it in an oral examination. For purposes of registration, this work will be designated **Engineering 890.** Doctoral Research and Thesis. Theses will be examined not only by the student's supervisory committee, but also by an external examiner.

COURSES

The following are half-courses. In this programme a half-course consists of one two-hour period per week for fifteen weeks; the final examination in the half-course will be written during the fifteenth week, or during an examination period specified for each term. A course given in the summer term will, in general, require two attendances per week, each for two hours, over a period of approximately seven weeks.

Where applicable, an ability to write simple programmes in a standard computer language will be assumed.

COURSES AND TOPICS IN RESEARCH AREAS

All of the courses listed are half-courses (half-credits). Courses marked with an asterisk are offered in 1970-71. Summer courses will be offered in the summer of 1970.

901 - Engineering 601.* Engineering Analysis 1

Theory and application of topics in mathematics. Topics include : Matrix and Vector Analysis, Functions of a complex variable, Ordinary differential equations. (Summer only).

901 - Engineering 602.* Numerical Methods in Engineering Systems I

Methods of numerical solution of mathematical models in Engineering. Interpolation. Quadratures for numerical differentiation and integration of tabulated functions. Zeros of polynomials. Systems of linear and non-linear algebraic equations. Numerical solutions of ordinary differential equations using single and multi-step methods. Analysis of round-off and discretization errors. Numerical techniques for the inversion of matrices, and for determining eigenvalues and eigenvectors of matrices, state vectors and transfer vectors and matrices. (Fall term).

901 - Engineering 610.* Physical Systems

A study of modelling and analysis of physical systems with emphasis on similarities of systems in various media. Dynamic system elements. Generalized dynamic elements. Formulation of system equations and transfer functions using matrices. Signal flow graph theory. Analog simulation. Transient and steady state solutions. Frequency response analysis. Stability studies. (Summer only).

901 - Engineering 611. Stochastic Processes in Systems

Introduction to stochastic processes. Correlation functions and power spectra of stationary stochastic processes. Transformations of stochastic processes. Filtering, smoothing and prediction. Control of stochastic systems. Random vibrations.

Prerequisite : An introductory course in Probability and Statistics.

901 - Engineering 620.* Analog and Hybrid Simulation

Analog and hybrid computer fundamentals; programming of differential equations on analog computers; scaling techniques; generation of explicit and implicit functions; error analysis; logic circuits and their application in analog computing; analog /hybrid computer. (Fall term).

901 - Engineering 630. Advanced Dynamics

Dynamics of rigid bodies, D'Alembert's principle, generalized coordinates, energy methods, Hamilton's theory, the Euler-Lagrange equations, variational principle of mechanics, Lagrangian multiplier method, Jacobi's principle, the phase space canonical transformations, Hamilton-Jacobi equations, theory of gyroscopes, general theory of orbits, relativistic mechanics.

901 - Engineering 640.* Advanced Fluid Mechanics

Introduction to tensor analysis, basic equations of fluid mechanics, Laminar boundary flow theory, stability problems and the transition region. Applications to industrial problems. (Fall term).

901 - Engineering 650. Applied Elasticity

Plane stress and strain. Analysis of stress and strain in three dimensions. Airy's stress function. Solution of two-dimensional problems by polynomials and Fourier series. Effect of small holes in bars and plates. Torsion and bending of prismatical bars. Membrane analogy. Thermoelasticity. Rectangular, circular, ring-shaped flat plates. Applications in civil and mechanical engineering.

901 - Engineering 651.* Matrix Analysis of Structures

Analysis of statically loaded framed structures by matrix methods; energy concepts in matrix form; transformation of information in structures; flexibility and stiffness methods; computer applications. (Winter term).

901 - Engineering 660.* Computer Organization

Component parts, organization and relation to programming, of a modern digital computer. Topics include : logic devices; word and byte structures; serial and parallel processing; data structures and effect on hardware construction; parity and operation checking; memory and storage units; registers; peripheral equipment; interrupts; real-time hardware; communications hardware; multiplexing; machine language and assembler programming.

Prerequisite : A knowledge of programming. (Fall term).

901 - Engineering 701. Engineering Analysis II

Advanced topics in mathematics. Topics include : Sturm-Liouville problem, orthogonal functions, partial differential equations, boundary value problems, integral transforms. Introduction to the calculus of variations. Tensor analysis.

Prerequisite : E 601 or equivalent.

901 - Engineering 702.* Numerical Methods in Engineering Systems II

Finite difference forms for elliptic, parabolic and hyperbolic partial differential equations. Minimization techniques for linear and non-linear systems, with applications to closed loop systems. Curve fitting and Fourier synthesis.

Prerequisite : E 602 or equivalent. (Winter term).

901 - Engineering 710. Topics in Systems Theory

Topics offered include : physical systems; linear systems; nonlinear systems; sample-data systems.

Prerequisite : E 610 or equivalent.

901 - Engineering 712.* Linear Systems

Types of system representation; the state variable form, the differential operator form, the transfer matrix form. State variable representation via the energy approach, the Lagrangian state function. Concepts of controllability and observability. Coordinate transformations and the canonical forms. Solutions of the state space equations. Time domain analysis of systems. Stability analysis of systems and the Liapunov functions

Prerequisite : E 610 or equivalent. (Fall term).

901 - Engineering 720. Topics in Systems Simulation

Topics offered include : Hybrid computer programming; advanced simulation techniques.

Prerequisite : E 620 or equivalent.

901 - Engineering 722.* Advanced Simulation Techniques

Hybrid computers involving a stored programme digital computer; hybrid software; iterative computation; adaptive and optimization techniques, random process simulation; the use of statistical methods.

Prerequisite : E 620 or equivalent. (Winter term).

901 - Engineering 729. Adaptive and Optimal Control Theory

Adaptive control and learning systems. Calculus of variations. Continuous form of the optimum principle, Pontryagin's Maximum principle. Discrete form of optimum principle, dynamic programming. Optimal control systems.

Prerequisite : E 610 or equivalent.

901 - Engineering 740. Topics in Fluid Control Systems and Elements

These studies deal with special topics in fluid control systems and elements such as pneumatic and hydraulic controls, fluidic devices and systems, and hydraulic power systems where fluid motion and displacement contain and transmit information as well as power. Topics offered include : fluidic elements and systems; analysis and design of process control applications; simulation of industrial processes.

Prerequisite : E 640 or equivalent.

901 - Engineering 741.* Fluidic Elements and Systems

Principles and operating characteristics of fluidic elements, modelling of wall attachment, beam-deflection, turbulent, and vortex amplifiers, "noise" in fluidic devices, application of flow visualization technique in the design of fluid amplifiers, passive fluidic elements, digital and analog fluidic circuit theories and their applications; case studies of fluidic systems.

Prerequisite : E 640 or equivalent. (Summer only).

901 - Engineering 742.* Industrial Process Control and Computer Applications

Digital and analog modelling of processes, design of control algorithms and their testing using digital and analog simulation, hybrid models of the complete plant — integrated continuous and discrete simulation, management and process information system — their relationship to computer control systems and models.

Prerequisite : E 610; E 620 or equivalent. (Winter term).

901 - Engineering 750. Topics in Solid Mechanics

Topics offered include : theory of elastic and inelastic stability; experimental stress analysis; the finite element method in structural mechanics; mechanics of composite structures.

Prerequisite : E 650 or equivalent.

901 - Engineering 752.* Experimental Stress Analysis

Photoelasticity : two-dimensional stress fields, models, types of polariscopes, the shear difference method, three-dimensional stress fields, relaxation solution, oblique incidence, isotropic points; frozen patterns, scattered light analysis; photoelastic coating; photoelastic strain gages. Electrical Strain Gages: gage construction; temperature compensation; gage selection; gage sensitivities and gage factor; adhesives; strain cycling, effects due to moisture, humidity, time and direct loading; multi-element rosettes; strain-gage circuits and instrumentation. Moiré Fringes, brittle lacquer, models and analogs. Mechanical and optical strain gages.

Prerequisite : E 650 or equivalent. (Winter term).

901 - Engineering 753.* The Finite Element Method in Structural Mechanics

Displacement analysis of structures. Finite elements of a continuum. Applications of the method of stress analysis of two – and three – dimensional structures, stability problems, vibrations and heat transfer. Digital computer applications.

Prerequisite : E 651 or equivalent. (Fall term).

901 - Engineering 760. Topics in Computer Science

Topics offered include : computer operating systems; computer software.

Prerequisite : E 660 or equivalent.

901 - Engineering 761.* Computer Operating Systems

Component parts of a complete operating system; effect on computer operation. Topics include : general principles of an operating system; batch operating systems; executive programme; input and output control systems; time sharing and multi-programming; scheduling considerations; programme linkages and subroutine; library structures; file manipulation; real-time and communication considerations; future developments.

Prerequisite : E 660 or equivalent. (Winter term).

903 - Civil Engineering 600.* Reinforced Concrete

Analysis and design by ultimate strength methods of beams, columns, slabs, continuous frames, composite and prestressed concrete members; arch and shell roofs; concrete building systems; new ACI and NBC codes; computer applications; design manuals; yield-line analysis of slabs. (Fall term).

903 - Civil Engineering 700. Topics in Structural Engineering

Topics offered include : structural synthesis; structural dynamics; failure of metal assemblies; strength of structures; suspended and stiffened cable structures, substructural analysis and design; foundation design; prestressed concrete; hydroelasticity.

Prerequisite : E 651 or equivalent.

903 - Civil Engineering 701.* Structural Synthesis

Structures of minimum material consumption. Theory of Maxwell-Michell structures. Automated optimum design of structural systems. Applications of mathematical programming techniques to systematic optimum design of structures under various constraints such as stress, deflection, buckling, reliability and costs.

Prerequisite : E 651 or equivalent. (Winter term).

903 - Civil Engineering 703.* Failure of Metal Assemblies

The many possible reasons for the failure of a metal structure to perform its function are examined, including elastic deformations, yielding, buckling, fatigue, creep, brittle fracture, with comparison of elastic design and limit design, and concepts of safety and optimization.

Prerequisite : E 651 or equivalent. (Winter term).

903 - Civil Engineering 710. Topics in Plates and Shells

Topics offered include : Theory of plates and shells; multilayered plates and shells; stiffened plates and shells.

Prerequisite : E 650 or equivalent.

903 - Civil Engineering 713.* Stiffened Plates and Shells

Comparison of simplified theories for folded plates; continuous folded plates; multiple plates meeting at one joint; nonlinear solution; folded plates and industrialized building; theory and design of stiffened thin-plate elements; orthotropic plates and shells; fiber reinforced shells.

Prerequisite : E 650 or equivalent. (Summer only).

903 - Civil Engineering 720. Topics in Building Systems

Topics offered include : Systems building; industrialized buildings; modern steel buildings; modern concrete buildings; reliability analysis.

Prerequisite : E 651 or equivalent.

903 - Civil Engineering 721.* Systems Building

Systems approach to planning, organization, and implementation of a project, from initiation of the concept to the administration of the occupied building, including architecture, engineering, construction and socio-economic considerations. The industrialization of the building as a product, including structure, weather screen, and all essential fittings and equipment.

Prerequisite : E 651 or equivalent. (Summer only).

903 - Civil Engineering 730. Topics in Bridge Engineering

Topics offered include : theory and design of modern bridge systems; theory and design of orthotropic bridges; theory and design of cable-stayed bridges; theory and design of modern bridge systems.

Prerequisite : E 651 or equivalent.

903 - Civil Engineering 731.* Theory and Design of Modern Bridge Systems

Hybrid, post-stressed and composite plate girders and trusses. Delta type girders. Orthotropic, shell type and tubular bridges. Cable-stayed and stiffened cable bridges. Optimization of bridge systems. Vibrations and damping capacity. Aerodynamical and seismic stability. Concept of safety. Fatigue and carrying capacity. Use of models. Application of computers.

Prerequisite : E 651 or equivalent. (Fall term).

903 - Civil Engineering 740. Topics in Transportation Engineering

Topics offered include : traffic studies and characteristics; traffic regulation and operation; urban planning; urban transportation and system planning; urban transportation system analysis; highway planning and ecenomics; advanced geometric design of highways.

Prerequisite : Graduate course in Transportation or equivalent.

903 - Civil Engineering 744.* Urban Transportation System Planning

The urban transportation problem; urban travel characteristics; urban transportation planning studies; land use and trip generation; trip distribution and trip assignment, modal split.

Prerequisite : Graduate Course in Transportation or equivalent. (Fall term).

903 - Civil Engineering 745.* Urban Transportation System Analysis

Application of mathematical models and the electronic computer to the analysis and evaluation of urban transportation problems. Multiple use and design team concepts. Urban planning and transportation. Transportation administration.

Prerequisite : Graduate Course in Transportation or equivalent. (Winter term).

903 - Civil Engineering 760. Topics in Water Resources

Topics offered include : design of water resources systems; advanced hydrology; statistical hydrology; open channel flow; water power engineering and hydromachinery; advanced hydromechanics.

Prerequisite : Graduate course in Water Resources or equivalent.

903 - Civil Engineering 761.* Design of Water Resources Systems

Objectives of water resource development; basic economic and technologic concepts; economic factors affecting system design; graphic techniques; multi-unit, multi-purpose water resource system; a simplified river-basin system; conventional methods of analysis; analysis of simulation; programming techniques (computer); examination of response surface; operating procedures; mathematical synthesis of streamflow sequences for the analysis of river-basins by simulation; mathematical models, the multistructure approach; mathematical models, a stochastic sequential approach; system design and the political process.

Prerequisite : Graduate Course in Water Resources or equivalent. (Fall term).

903 - Civil Engineering 762.* Advanced Hydrology

Linear and non-linear hydrology systems; small watersheds; design factors related to urban areas; sediment transport; Stochastic models in hydrology and their analysis; analogue and digital computer solutions; digital filtering of storm data records.

Prerequisite : Graduate Course in Water Resources or equivalent. (Winter term).

903 - Civil Engineering 800. Modern Developments in Structures

Current topics selected from theories of structures; plates and shells; building systems; bridge systems.

Prerequisite : CE 700 or equivalent.

905 - Electrical Engineering 600. Statistical Theory of Communication

Review of probability and random variables, stochastic processes; sampling theory; spectral analysis; Gaussian process; optimum linear systems and filtering; statistical decision theory.

905 - Electrical Engineering 660. Electrodynamics

Maxwell's equations in free space. Fields and matter. Electromagnetic energy and power. Sinusoidal steady state. Electromagnetic fields in moving media. Forces and energy in moving systems.

905 - Electrical Engineering 700. Topics in Network Analysis

Topics offered include : lumped network analysis; linear graphs and electric networks.

Prerequisite : E 610 or equivalent.

905 - Electrical Engineering 701.* Lumped Network Analysis

Formulation of impedance and admittance matrices and their properties. Indefinite admittance matrix and its applications. General two-ports : passivity, reciprocity and stability. The state variable analysis of networks.

Prerequisite : E 610 or equivalent. (Fall term).

905 - Electrical Engineering 702.* Linear Graphs and Electrical Networks

Basic properties of graphs. Vector spaces associated with a graph, non-directed and directed graphs. Topological formulas. Applications to network analysis, synthesis and switching theory. Flow graphs and other applications of graph theory.

Prerequisite : E 610 or equivalent. (Winter term).

905 - Electrical Engineering 710. Topics in Network Synthesis

Topics offered include : passive network synthesis; active network synthesis; distributed parameter network synthesis.

Prerequisite : E 610 or equivalent.

905 - Electrical Engineering 711.* Passive Network Synthesis

Positive real functions; RLC driving point function synthesis; Cascade synthesis of one-port networks; Realization of lossless one-port network; Insertion loss synthesis; Realization of RC two-ports; General passive two-ports; Approximation in frequency and time domains.

Prerequisite : E 610 or equivalent. (Summer only).

905 - Electrical Engineering 712.* Active Network Synthesis

Limitations of passive network synthesis. Active network elements and their uses in the synthesis of network functions. Polynomial decompositions and their applications. Sensitivity, selectivity and related topics.

Prerequisite : EE 711 or equivalent. (Fall term).

905 - Electrical Engineering 713.* Distributed Parameter Network Synthesis

Properties of distributed parameter structures, including both uniformly and nonuniformly tapered lines. Basic nonuniform transmission lines. RC transmission lines. Synthesis of network functions using transmission lines. Introduction to multivariable synthesis. The approximation problem.

Prerequisite : EE 711 or equivalent. (Winter term).

905 - Electrical Engineering 720. Topics in Microelectronics

Topics offered include : electronic conduction in solids; microwave semiconductor devices; materials technology; device technology.

Prerequisite : EE 660 or equivalent.

905 - Electrical Engineering 722.* Microwave Semiconductor Devices

Principles and functions of microwave semiconductor devices, Varactor diodes and applications, Microwave solid state switches, limiters and phase shifters. Schottky-barrier devices. Detector and mixer diodes and circuits. Tunnel diodes and circuits. Avalanche transit-time diodes. Bulk-effect devices.

Prerequisite : EE 660 or equivalent. (Winter term).

905 - Electrical Engineering 723.* Materials Technology

Semiconductor chemistry. Binding and semiconductor properties. Crystal growth. Solubility of impurities. Passivation and diffusion physics. Metallurgy. Deposition techniques. Thin and Thick film devices. Photolitography. Material evaluation techniques.

Prerequisite : EE 660 or equivalent. (Summer only).

905 - Electrical Engineering 724.* Device Technology

Technology of rectifiers, transistors. Metal semiconductor, metal insulator semiconductor, p-n-p-n and junction field effect devices. Optoelectronics. Linear and Digital integrated circuits. Limitations and advantages of microminiaturization.

Prerequisite. EE 660 or equivalent. (Fall term).

905 - Electrical Engineering 760. Topics in High Frequency Phenomena

Topics offered include : wave propagation; microwave device analysis; fundamental concepts of lasers; laser spectroscopy and applications.

Prerequisite : EE 660 or equivalent.

905 - Electrical Engineering 761.* Wave Propagation

Radiation from monochromatic sources in unbounded regions. Radiation from wire antennas. Multipole expansion of the radiated field. Transmission systems. Slow wave propagation. Coupled mode theory. Doppler effect in dispersive media. Propagation in anisotropic media.

Prerequisite : EE 660 or equivalent. (Fall term).

905 - Electrical Engineering 763.* Fundamental Concepts of Lasers

Basic theorems and postulates of quantum mechanics. Time independent Schrodinger equation. Matrix mechanics. Elementary quantum systems. Quantization of lattice vibration and of electromagnetic radiation. Polarization, diamagnetism and paramagnetism.

Prerequisite : EE 660 or equivalent. (Winter term).

905 - Electrical Engineering 800. Modern Developments in Networks and Systems

Current topics selected from : networks; system simulation.

Prerequisite : E 710 or equivalent.

908 - Mechanical Engineering 600.* Mechanics of Continuous Media

Mathematical preliminaries; review of cartesian tensors; stresses in a continuum; stress quadrics; deformation and flow; strain tensors; compatibility equations; finite strain; instantaneous motion; material rates of change; momentum and energy theorems; constitutive equations; perfect and viscous fluids; classical theory of elasticity; introduction to thermoelasticity and viscoelasticity. (Fall term).

908 - Mechanical Engineering 601.* Engineering Thermodynamics

Rigorous treatment of thermodynamic principles and their applications to reversible and irreversible processes with systems composed of pure substances and those involving external forces. (Fall term).

908 - Mechanical Engineering 700. Topics in Transport Processes

Topics offered include : turbulent flow; compressible fluid flow; boundary layer theory; gas dynamics; fluid machinery; conduction heat transfer; convection heat transfer; radiation.

Prerequisite : E 640 or equivalent.

908 - Mechanical Engineering 701.* Turbulent Flow

Origin of turbulence, momentum and energy equations for turbulent flow, incompressible and compressible boundary layer flows, free turbulent flow, turbulent shear flow, advanced turbulence models, generalized computer programme for treating two-dimensional boundary layer flows.

Prerequisite : E 640 or equivalent. (Summer only).

908 - Mechanical Engineering 704.* Gas Dynamics

Combined effects in one-dimensional flow, multi-dimensional flow, method of characteristics, one-dimensional treatment of non-steady gas dynamics, shock wave interactions, flow of real gases, selected papers on combustion and detonation.

Prerequisite : E 640 or equivalent. (Fall term).

908 - Mechanical Engineering 705.* Fluid Machinery

Cascade mechanics and boundary layers; thin airfoil theory, laws of three-dimensional fluid flow and two-dimensional solutions, radial equilibrium, theory of cavitation.

Prerequisite : E 640 or equivalent. (Winter term).

908 - Mechanical Engineering 706.* Conduction Heat Transfer

Solutions by analytical, numerical, analogue and graphical methods to steady and transient temperature fields with and without heat sources, introduction to convection.

Prerequisite : E 640 or equivalent. (Winter term).

908 - Mechanical Engineering 740. Topics in Vibrations

Topics offered include : theoretical methods and applications of vibration analysis; nonlinear oscillations; asymptotic methods; random vibrations; stability of vibratory systems.

Prerequisite : E 630 or equivalent.

908 - Mechanical Engineering 741.* Methods and Applications of Vibration Analysis

Undamped and damped free vibrations, vibrations under periodic and non-periodic forces, analysis of many degree of freedom systems and continuous systems, coupled oscillations, vibration measurements and introduction to non-linear and random oscillations.

Prerequisite : E 630 or equivalent. (Winter term).

908 - Mechanical Engineering 760. Topics in Mechanics of Metal Cutting and Design of Machine Tools

Topics offered include : mechanics and dynamics of metal machining and surface geometry; theory and design of basic units and systems of machine tools; numerical and adaptive control of machine systems; vibration problems in machine systems and components; random processes in manufacturing systems.

Prerequisite : E 630 or equivalent.

908 - Mechanical Engineering 762.* Theory and Design of Machine Tools

Dynamics and self-induced vibrations in the metal cutting process, analysis and design of speed change gears, mechanical, electrical, and hydraulic drives, hydraulic copying systems and automatic control, numerical control of machine tools, machine tool vibrations, random processes in manufacturing systems.

Prerequisite : E 630 or equivalent. (Summer only).

908 - Mechanical Engineering 770. Topics in Material Science

Topics offered include : mechanical shaping and forming; powder metallurgy; casting; welding; fracture, fatigue, and creep; high strength materials; ceramics; polymers; corrosion.

Prerequisite : Graduate course in Material Science or equivalent.

908 - Mechanical Engineering 772.* Powder Metallurgy

Manufacture and properties of powders. Pressing of powders; theory, die design, hydrostatic, rolling, extrusion, explosive, slip casting, sintering mechanisms and kinetics; volume diffusion, pores and grain boundaries, two component systems, activated sintering. Hot pressing, fritting, effect of wetting. Powder metallurgy products; special shapes with close tolerances, porous materials, bearings, immiscible metal combinations, metal-non-metal combinations; sintered carbides, cermets, ceramics. (Fall term).

Prerequisite : Graduate course in Material Science or equivalent.

908 - Mechanical Engineering 776.* High Strength Materials

Studies of the microstructures responsible for high strength, and of the thermomechanical treatments producing these micro-structures. Dislocation theory, strain hardening; strengthening by solid-solution, massive hard phases, precipitation, dispersed particles, and martensitic and bainitic structures. Fibres and fibre composites. Residual stresses of thermal or mechanical origin. (Winter term).

Prerequisite : Graduate course in Material Science or equivalent.

908 - Mechanical Engineering 800. Modern Developments in Transport Processes

Current topics selected from : heat, mass and momentum transfer.

Prerequisite : ME 700 or equivalent.

N.B. Course listings for 1970-71 are tentative, and may change without notice.

901 - Engineering 882. Major Technical Report (2 half-credits)

Registration Sequence: E881 and E882 (First and Second Registration)

901 - Engineering 884. Dissertation (4 half-credits)

Registration Sequence. E881 to E884 (First to Fourth Registration)

901 - Engineering 886. Full Research Thesis (6 half-credits)

Registration Sequence: E881 to E886 (First to Sixth Registration)

The student registers for dissertation work in the same way as he registers for any other half-course in his programme. The appropriate registration sequence and the total number of half-credits for the different dissertation options are shown above.

The Engineering Graduate Studies Committee will determine which of these dissertation options is appropriate in a particular student's programme.

The dissertation, which can vary from a full research thesis to a major technical report, may be based on one of the following :

(a) A theoretical study of a significant engineering problem.

(b) A research, design and/or development project conducted in the Engineering Laboratories of Sir George Williams University.

(c) A research, design and/or development project conducted as part of the student's full-time employment.
Permission to submit a dissertation in this category will be granted only in the event that :

(i) The student's employer furnishes written approval for the pursuit and reporting of the project;

(ii) The student has research facilities which, in the opinion of the Engineering Graduate Studies Committee, are adequate;

(iii) Arrangements can be made for supervision of the project by a member of the staff of the Faculty of Engineering;

(iv) In appropriate cases, the student has direct supervision by a qualified supervisor at the site of the student's employment. The choice of supervisor must be approved by the Engineering Graduate Studies Committee.

(d) An ordered and critical exposition of the literature on an appropriate topic in engineering.

The dissertation must represent the results of the student's independent work undertaken after admission to this Programme. Work previously published by the student may be used only as introductory or background subject-matter.

The proposed topic for the dissertation, together with a brief statement outlining the proposed method of treatment, must be approved by the Engineering Graduate Studies Committee.

The dissertation will be evaluated by at least two examiners appointed by the Engineering Graduate Studies Committee.

Applications for admission must be received by August 10, 1970 for the fall term, December 5, 1970 for the winter term, and April 1, 1971 for the summer term.